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ART. L.—DRIMYS WINTERI, *Forster, De Candolle.* (Winter's Bark Tree.) With a Figure.

By Joseph Carson, M. D.

Sex. Syst.—Polyandria, Polygynia.

Gen. Char.—See D. *chilensis*, in last number.

Specific Char.—Leaves oblong, obtuse, glaucous beneath. Peduncles simple, approximated or very short, divided into elongated pedicels.—*(De Candolle, Prodromus.)*

Winter's Bark was brought before the medical profession in a paper read to the Medical Society of London, in 1779, by Dr. John Fothergill. It is contained in the fifth volume of "Medical Observations and Inquiries." In this paper is a history of the discovery of the tree, with a botanical account of it drawn up by the celebrated Dr. Solander. It appears that the tree and the bark were unknown, until the return of Captain John Winter from a voyage to the South Seas in 1579. Captain Winter was the commander of the ship Elizabeth, which sailed with Sir Francis Drake in 1577; but after having passed through the Straits of Magellan, on the 8th of October of the following year, was obliged by stress of weather to return to the Straits, and remaining there some time procured the bark which Clusius in honour of him named *Cortex Winteranus.*

Other navigators upon visiting the Straits noticed the tree, but nothing definite was known of its botany, until, in 1691, a Mr. George Handasyd, upon his return, presented some specimens to Sir Hans Sloane, who gave a description and figure in the Philosophical Transactions. But it appears that the flowers and fruit were wanting, and a systematic location was impossible, until, in 1768, Capt. Wallis, of the Dolphin, brought some perfect specimens, which came into the hands of Dr. Solander, who, from these and his observations when staying at Terra del Fuego, drew up his description.

"Winter's Bark Tree (*Winterana aromatica*) is one of the largest forest trees upon Terra del Fuego; it often rises to the height of fifty feet. Its outward bark is on the trunk gray, and very little wrinkled; on the branches quite smooth and green.

"The branches do not spread horizontally, but bend upwards, and form an elegant head of an oval shape.

"The leaves come out without order, of an oval, elliptic shape, quite entire, obtuse, flat, smooth, shining, of a thick leathery substance, evergreen; on the upper side of a lively deep green colour, and of a pale bluish colour underneath, without any nerves, and their veins scarcely visible; they are sometimes narrower near the footstalks, and there their margins are bent downwards.

"In general the leaves are from three to four inches long, and between one and two broad; they have very short footstalks, seldom half an inch long, which are smooth, concave on the upper side, and convex underneath. From the scars of the old footstalks the branches are often tuberculated.

"The peduncles or footstalks for the flowers, come out of the axillæ foliorum, near the extremity of the branches; they are flat, of a pale colour, twice or three times shorter than the leaves, now and then support only one flower, but

are oftener near the top divided into three short branches, each with one flower. The bracteæ are oblong, pointed, concave, entire, thick, whitish, and situated at the basis of each peduncle.

"*Calyx or flower cup* it has none, but in its place the flower is surrounded with a spathaceous germ, of a thick leathery substance, green, but reddish on the side which has faced the sun; before this germ bursts, it is of a round form, and its size is of a small pea. It bursts commonly, so that one side is higher than the other, and the segments are pointed.

"The *corolla* consists always of seven petals, which are oval, obtuse, concave, erect, white, have small veins, and are of an unequal size, the largest scarcely four lines long; they very soon fade and drop off, almost as soon as the germ bursts.

"The *filaments* are from fifteen to thirty, and are placed on the flat end side of the receptacle; they are much shorter than the petals, and gradually decrease in length towards the sides.

"The *antheræ* are large, oval, longitudinally divided into two, or as if each was made up of two oblong antheræ.

"The *germina* are from three to six, placed above the receptacle, turbinated or of the shape of an inverted fig, flat on the inside and somewhat higher than the stamina; they have no styles, but terminate in a stigma which is divided into two or three small lobes."

The fruit was not seen by Dr. Solander in a ripe state, but in the immature condition is described as constituted of germs of a thick, fleshy substance, becoming unilocular seed vessels, and containing the rudiments of seeds, as in the generic account.

Captain Wallis stated that the trees are of various sizes according to the soil they grow upon and their situation. Those near the sea and in rocky ground were scrubby, the bark sticking close to the wood, and having a dirty look;

those on the plain ground and sheltered were straight and tall, rising to thirty or forty feet, and as thick as a middle-sized man. The bark is smooth and somewhat resembling the horse chesnut. In the neighborhood of Port Famine it is abundant. It flowers in March, which is the commencement of the fall. The bark attracted the attention of navigators from its warm, spicy, aromatic properties, and in the treatment of scorbutic diseases, which broke out in vessels going into the Straits of Magellan, was a valuable auxiliary. It is rarely brought into the market as a drug, but is sometimes confounded with the Canella alba from which it differs in colour, as it is pale-yellowish or dull-reddish gray, with elliptical dull-brown spots externally, and brown internally. It has an aromatic odour and a warm bitterish taste.

It contains resin, volatile oil and tannin, which last serves to distinguish between it and Canella, as the chemical evidences are present in one case and not in the other.

The medical properties of it are those of an aromatic and tonic. From its sensible qualities it was confounded with Canella alba. The medical uses are the same.

Some confusion is apparent among the authors who have treated of the tree with respect to its name; hence the different appellations by which it has been described. The generic term Winterana was bestowed by Linnæus in commemoration of its discoverer; in so doing, however, he mistook it for the Canella alba, and gave the account of the fructification of that plant. Browne, however, had stamped that genus with the name of Canella. Forster, having obtained the parts of fructification, gave to the plant the name of Drimys Winteri from its hot and pungent flavour. Murray, in his *Linn. Syst. Veg.*, gave the generic name Wintera, which he preferred to the original Linnæan one, and finally De Candolle has adopted the name of Forster in imitation of Lamarck.

By Lamarck a species has been made which he calls D. punctata, but which by De Candolle is regarded as a variety.

ART. LI.—OBSERVATIONS ON PODOPHYLLUM PELTATUM.

By John R. Lewis.

(*An Inaugural Essay.*)

The subject of this essay is among the most interesting of our indigenous Materia Medica, and has long attracted the attention of medical men for its active and efficient power as a cathartic; and were it not for the presence of a foreign drug in our market, possessed of similar and more active powers, there is little doubt but that the root of Podophyllum would attain a more prominent reputation as a purgative than it at present enjoys.

Its adoption in the United States Pharmacopœia, and the formula for the extract of it which there exists, are acknowledgements of its merits not to be disputed. Its chemical history has hitherto been but little examined into. Several years since Mr. Wm. Hodgson, Jr., of this city, in some experiments on this plant published in the American Journal of Pharmacy, describes a peculiar bitter principle existing in its root, which he obtained by boiling the drug with quick lime in water, and other subsequent treatment, but which he did not succeed in obtaining in a state of purity.

In the investigations detailed in the following pages, I have pursued the path pointed out by Mr. Hodgson as well as followed such indications as my own experience has suggested, which have thrown some light on the chemical relations of the Podophyllum, and shown a striking analogy between it and Jalap.

BOTANICAL HISTORY.

Podophyllum Peltatum.

Common names.—May Apple, Mandrake, Wild Lemon.

Sexual System.—Polyandria, Monogynia.

Natural Order.—Ranunculi, *Jussieu.*

PODOPHYLLEÆ, *Lindley.*

May Apple is an indigenous herbaceous plant, thriving in swampy, low, shady woods, being particularly adapted to rich and shaded soil, growing in patches close together, and sometimes covering a large extent of ground. The flowers, which are nodding and white, appear in May and June, are situated in the forks of the petioles at the top of the stems, having a corolla composed of about nine petals, and a calx of three oval concave leaves. The stamens number from twelve to twenty, surmounted by long yellow anthers. The stigma is sessile.

The stalk which is about twelve or sixteen inches high, supports two palmate leaves which are of a green colour, smooth on the top, veined and hairy on the under surface, and generally wither as soon as the fruit is matured. The fruit is a yellowish drupe about the size of a small hen's egg, resembling in shape and colour the fruit of Citrus limonis, from which it has derived the name of Wild Lemon.

The rhizoma, which is the only officinal part of the plant, is a long creeping jointed horizontal fleshy root; the joints which are much thicker than the other portions of the root are furnished with radicles of the same colour. In the dry state when broken it exhibits a whitish amylaceous fracture: externally it is of a reddish brown colour, corrugated and wrinkled lengthwise, has a bitter taste, and somewhat aromatic odour. It should be collected in the fall after the leaves and stalks are withered, or in spring as soon as the shoots are perceptible—the former is perhaps preferable, as the medical properties of the root, by its being in the ground all winter, are more or less subject to deterioration.

The decoction and tincture are very bitter; alcohol is the best solvent for the bitter principle, but diluted alcohol takes up a greater amount of extract, although it is much weaker in proportion to its bulk, therefore alcohol of 35° Baumé is preferable to any other menstruum for the extract, as it affords

the same quantity of active principle, in a much smaller bulk. Sixteen ounces of the fresh root loses in drying 11½ ounces of its weight, consequently 100 lbs. of the fresh, would yield 28 lbs. of dry root. Great care should be taken to exclude moisture from the dried root, as in this state it is deliquescent. The fresh root should be dried in the sun.

CHEMICAL HISTORY.

Vegetable Albumen.—An ounce of the fresh root was beaten into a pulp, with a portion of water, and the fluid separated by filtering. This liquid was precipitated of a dirty white colour by bichloride of mercury and ferrocyanide of potassium, and when heated to the boiling point a coagulum was produced, which, taken in connection with the two preceding tests, indicates the presence of vegetable albumen. This albuminous matter appears to be rendered insoluble by drying the root, as the cold infusion yields no evidence of its presence to the tests mentioned.

Gum.—Another portion of the decoction was precipitated by the solution of subacetate of lead of a dirty yellow colour; the precipitate when dried assumed a reddish brown hue. A cold infusion of the dry root coarsely powdered, was made, filtered, and tested for albumen, from which it proved to be perfectly free. To this infusion a solution of subacetate of lead was added, which produced a dirty yellow curdy precipitate, which did not change its colour like that in the preceding experiment. Another portion of the infusion was mixed with its bulk of alcohol, which caused a precipitate of the same colour.

Starch.—The decoction made with one ounce of May apple root to a pint of water, was precipitated of a dark blue colour by tincture of iodine.

Gallic Acid.—The presence of tannin in the decoction was not indicated on the addition of gelatin; but by the solutions of the per salts of iron a dark colored precipitate was thrown down, indicative of gallic acid.

Fixed Oil.—Four ounces of the coarsely powered root was macerated during 48 hours in alcohol of 35° Baumé, heated to the boiling point, and then displaced with the same menstruum. The tincture thus obtained of a beautiful colour, resembling dark Madeira wine, was evaporated to a nearly dry extract, which weighed 250 grains Troy. This extract was treated with cold ether, which yielded on evaporation 98 grains of a mixture of fixed oil, and a resinous substance of a light yellowish olive colour. When pressed between bibulous paper most of the oil was absorbed, and the resinous substance was left in a dry brittle state, breaking with a shining fracture. The fixed oil has a greenish yellow colour, and becomes rancid by exposure for some time to the air. The resinous substance was dissolved in alcohol and evaporated to an extract, which possessed quite a different appearance, than when it contained the fixed oil,—having a brown colour, extremely bitter taste, soluble in alcohol and ether, and partially soluble in hot oil of turpentine. It burns readily, leaving a carbonaceous matter, and gives off much smoke.

Ethereal Treatment.—A portion of the root in powder was macerated with a sufficient quantity of ether requisite for its exhaustion, the liquid when evaporated yielded an oily extract of a yellowish colour with a slightly olive tint; this was treated with cold alcohol of 35° Baumé, which dissolved the solid portion, leaving the fixed oil in the form of globules in the bottom of the solution. This latter was separated by decantation, the oil which was collected in a watch glass was moderately heated to drive off the adhering alcohol. The oil now was of a dull olive colour, about the consistence of castor oil, with no taste, but had a slight odour which was due to impurities, it was unctuous to the touch, left a permanent stain on paper, was soluble in a solution of caustic potash, and when precipitated from this solution by the addition of muriatic acid, a substance rose to the top

of the liquid which had all the appearance of an oil after being treated in that manner. When burnt it exhales the disagreeable odour of burning fat, and leaves a slight residue scarcely perceptible. This oil resembles that obtained by the alcoholic treatment in all its properties; it is soluble in hot alcohol and in cold ether.

Volatile Oil.—One pound of the fresh root was macerated in a sufficient quantity of water to cover it, for twenty-four hours, and distilled. The product was opaque, possessed the odour of the root, and had a mild nauseous taste. Twenty ounces of the dried root was macerated in the water obtained in the previous process for two days, and again distilled; the product had the same appearance and odour, but it was much stronger than that procured by the former distillation. It was kept in a closely stopped bottle for five months without the least apparent change in its character, except that it became more floculent, and separated in very light opaque scales. It was neutral to test paper.

A peculiar Resinous Principle.—A portion of the coarsely powdered root was macerated twenty-four hours in alcohol of 35° Baumé, then heated to the boiling point, and when cool was displaced. A transparent liquor of a beautiful wine colour was obtained, and evaporated in a water bath to the consistence of a thick extract, having a brown colour. This was treated with sulphuric ether of 55° Baumé, yielding all the fixed oil to it, and a large portion of the extract. The ethereal solution was of a light brown colour, and had a bitter taste, leaving when evaporated an oily and a resinous substance, like that already described. That portion of the extract not dissolved by the ether was boiled in distilled water, which dissolved a small part of it. The solution was of a dark brown colour, had a disagreeable and slightly bitter taste; the undissolved part having much the appearance of hæpatic aloes, was dissolved in alcohol of 42° Baumé, treated with pure animal charcoal, and the

liquid allowed to evaporate spontaneously. In this state it had but little colour, and was in form analogous to tannin. To purify it still further it was washed in cold distilled water. It is soluble in a solution of caustic potassa and aqua ammonia, from which it may be precipitated by the addition of an acid, very soluble in alcohol, less soluble in carbonate of potassa and carbonate of soda, and insoluble in water. A solution of it in alcohol has the same bitter taste as the substance resembling hæpatic aloes. Under peculiar circumstances, the cause of which I have not yet been able to find out, it assumes a hydrated form. Eight grains of the dark brown resin left after treatment with ether and water is sufficient for a strong purge; it is a hydrogogue cathartic operating with griping, and producing a nauseating effect. Six grains of the resin still purer, operated as a *drastic* cathartic; it also occasioned vomiting and great debility. In the pure and colourless state it is amorphous. By one operation it was obtained in opaque feathery scales, by another in a light colorless powder, another in a translucent gelatinized mass, and often in globules like dried gelatin. Repeated efforts were made to crystallize it, but without success.

Four ounces of the root in coarse powder was boiled a few minutes in a mixture of alcohol and water in the proportion of one of the former and two and a half of the latter; when cold it was displaced. The liquor was of a reddish brown colour and yielded on evaporation by water bath twenty-four per cent of dry brown colored deliquescent extract, which was reduced to powder, treated with alcohol of 42° Baumé, boiled with purified animal charcoal, filtered, and allowed to evaporate spontaneously. The residue was of a very light brownish colour, had the appearance of a resin, and was redissolved in alcohol of 42° Baumé, and precipitated by water, which operation left a large portion of coloring matter in solution. The precipitate was sepa-

rated, washed with distilled water, dissolved in alcohol of 42° Baumé, and left to evaporate. It was now in a very pure state, and analogous in its character to that obtained in the preceding experiment. Its alcoholic solution was bitter and caused a raw scratching sensation in the throat; it is dissolved and decomposed by nitric acid, producing a beautiful light burnt umber colour, approaching to a purple; and by sulphuric acid, to which it imparts a rich olive colour with a purple shade around undissolved portions. It is very soluble in hot diluted alcohol. Ten ounces of the dried root was treated according to the process of Mr. Wm. Hodgson, Jr., viz., by boiling it in water with lime, precipitating the clear liquid with sulphate of zinc, evaporating the filtered liquid to dryness, treating the residue with cold alcohol of 42° Baumé, and animal charcoal, and allowing it to evaporate spontaneously. The substance thus obtained was in the form of a gelatinous mass, resembling that described in the preceding operations, except that it was more soluble in hot water, apparently being converted into a hydrate by the lime treatment. Six grains of this mass was taken without any apparent effect, owing perhaps to its containing a large amount of water and impurities.

Ashes of the Root.—A portion of the root was incinerated, the product which weighed twenty-two grains was lixiviated with water, which dissolved out four and a half grains of solid matter. The liquid was reduced by evaporation, and a solution of tartaric acid was added, which caused a liberation of carbonic acid.

In a few minutes after the effervescence had ceased, a large quantity of shining crystals were precipitated, which had the characteristics of bitartrate of potassa.

Nitric acid in excess was added to a portion of the lixiviated liquid, which caused carbonic acid to be given off, and on the addition of nitrate of silver a white precipitate was thrown down of chloride of silver.

The ashes remaining after lixiviation were mixed with dilute muriatic acid and left to stand for a short time. The solution being separated by filtration, produced a precipitate with binoxalate of potassa consisting of oxalate of lime.

By the experiments detailed in this essay, it has been shown that the root contains the following principles:

Vegetable Albumen, Gum, Starch, Gallic acid, Fixed Oil, traces of *Volatile Oil, a Peculiar Resinous Principle,* soluble in alcohol and ether, and another soluble in alcohol only. Both possessed the active properties of the root, but the former is most active. The ashes were found to contain potassa, lime, and a chloride.

To these may be added as constituents of the root, lignin and extractive matter.

ART. LII.—ON EMPLASTRUM PLUMBI.

By N. Spencer Thomas.

(*An Inaugural Essay.*)

1st. One pint of olive oil was treated by boiling with two ounces of hydrated sesquioxide of iron, a portion of water being added as in the preparation of lead plaster; the mixture was kept at the temperature of 212° over a steady fire (fresh portions of water being added as the evaporation proceeded) for the space of three hours, at which time no change had taken place, except in colour, which was somewhat lighter than before the operation was commenced, probably from a change of oxidation, and not from any union of the oily acids with the oxide of iron.

After it had cooled sufficiently, the mixture was transferred to a bottle, and allowed to stand undisturbed for twenty-four hours, at which time the oxide of iron had entirely separated from the oil, which was as clear and transparent as before being submitted to the operation.

2d. The same quantity of olive oil as in experiment 1st, was treated in the same manner with half a pound of anhydrous sesquioxide of iron, the result being the same as in experiment 1st.

3d. One pint of olive oil was boiled with a half pound of protoxide of iron (prepared fresh, and added to the oil with the water, that it should not become peroxidized before being mixed with the oil) for the same length of time as in experiment 1st. After the water in which the protoxide of iron was added was driven off, the mixture was kept over a regular fire for a half hour, when it rose considerably above the boiling point of water; it was then removed from the fire, and water gradually added to reduce the temperature to 212°. Upon cooling, the oxide separated as in the former experiments; it being now black, it was probably in the state of a black oxide; the oil had a dark colour, caused probably by its being raised to too high a temperature, and slightly burnt. These experiments I think prove satisfactorily that the oxides of iron will not combine directly with the oily acids to form a plaster.

4th. Being in possession of an article of American litharge, which on former occasions had thrown down a precipitate of metallic lead, during the process of forming lead plaster, I determined to add a portion of red lead (oxid: plumb: rub:) with a view of supplying oxygen to the metallic lead. I therefore in this experiment took of litharge nine parts, of red oxide of lead one part; five pounds of which was added to one gallon of olive oil and two pints of water. The mixture was placed over a regular fire, and as it rose to the boiling point of water, and was continued

at that degree of temperature, it gradually became darker—the yellow colour of the litharge giving way to a reddish hue. As the operation proceeded, the mass assumed a peculiar soapy appearance, the red hue gradually disappeared, until after about two hours boiling a plaster was formed, which upon being removed from the fire, and allowed to stand for a short time, became covered with a bright red froth, while the plaster below was of a dull brownish colour, and not white as when litharge alone is used. The red lead employed in this case failed to perform the desired effect, the residue or sediment of metallic lead falling to the bottom amounting to about one-fortieth of the weight of the litharge used in the process. I would add that the plaster formed with this kind of litharge is generally of a lighter colour, and more transparent when melted than that made with litharge, which produces no such precipitate; and probably this occurs, from the fact of the lead assuming a floculent form, and acting in the same way that gelatin does in clarifying liquors,—carrying down with it any particles of foreign matter that exists in the melted mass.

5th. Five pounds of English litharge in fine powder was mixed with one gallon of olive oil, two pints of water being added, as directed by the U. S. Pharmacopœia. The boiling was carried on as directed by that authority; the colour of the mass became lighter, as the operation was continued. Boiling water was added from time to time, and at the expiration of three and a quarter hours a plaster was formed of good consistence—white, with a slightly greenish tint, which is attributable to the chlorophylle, or green colouring matter in the oil. The change or variety in colour observable in experiment fourth did not occur in this experiment. Seven pints of water were necessary to the completion of the process.

6th. The same quantity of materials (the American litharge being substituted) as in experiment fifth, were mixed

and treated in the manner directed for the formation of lead plaster. This parcel underwent the same change in colour, as noticed in the fourth experiment. Two and a quarter hours were required for its completion, and four and a half pints of water were consumed. The deposite of metallic lead in this instance was the same as that in the parcel where red lead was used. The plaster, however, after standing undisturbed for about five minutes, and thrown into cold water, had as fine a consistence as that made with English litharge.

7th. Eight pounds of lard being melted, five pounds of litharge (American) finely powdered was stirred into it, and a small quantity of water being added, the boiling was commenced and continued briskly, with constant stirring, until the water was driven off; then the mass attained a temperature above that of boiling water; it was removed from the fire and a fresh supply of water being added, an immediate union of the fatty acids and oxide of lead took place; a plaster being formed in a much shorter time than when the mode prescribed by the Pharmacopœia is closely adhered to. This plaster was of a good consistence, and as white, and apparently as perfectly formed as that prepared in the ordinary way. The danger of discolouring I conceive to be but little if any greater by this mode of proceeding, than by that directed by the Pharmacopœia; for the same reason that syrups may become empyreumatic by rapid boiling, the steam forming bubbles on the bottom of the vessel where the fire acts, as in this case the temperature would be about the same.

8th. A quantity of lard was boiled with an equal weight of water for fifteen minutes, then removed from the fire, and the lard allowed to harden. The lard was then subjected to the action of litharge and formed a plaster in much less time than lard that had not been treated in this way. A portion of the plaster resulting from experiment

7th was melted with resin in the proportion directed for adhesive plaster; it made a harder plaster than the result of experiment 5th, in which case olive oil was used. I account for this from the fact that the stearate is firmer than the oleate of lead. There was a slight difference in the fracture of the adhesive plaster, that made from the olive oil having a more shining fracture, than that from the lard. When applied to the skin the sticking qualities appeared the same.

The combining weight of stearine being much greater than that of olein, a less quantity of litharge would be required to convert it into a plaster, and there may be some advantage in using a plaster of this kind; as there is upon record a case of lead-cholic, as having occurred from the use of lead plaster, it might be desirable to use that which contains the smallest proportion of lead.

9th. A small quantity of officinal lead plaster was boiled with carbonate of soda, and was decomposed, forming a soap of soda, and carbonate of lead. When boiled with caustic potassa, a soap of potassa and oil was formed, and neutral margarate of lead was thrown down, which consists of one equivalent of margaric acid 140, and one equivalent oxide of lead 111.6 combined with one equivalent of water 9=260.6.

From these experiments it would appear first, that a plaster cannot be formed directly by the oxides of iron; and 2d, the specimen of American litharge used consisted of a prot and suboxide of lead, and when acted on by the oily acids it was reduced to a protoxide and metallic lead, the change of colour would indicate that oxygen is absorbed by a part, while that which parts with its oxygen is reduced; and 3dly, as the lead assumes a floculent form, and thereby improves the appearance of the plaster, it is an advantage; and 4th, it proves that lard is equal to olive-oil in all respects for making plaster, and perhaps advantageous on account of less litharge being required; and also another advantage

in the preparation of it is, that less time is required for the accomplishment of the same object, than where the directions of the Pharmacopœia are strictly followed. A receipt, then, for lead-plaster that might be preferable to that of the Pharmacopœia, would be,—lard, eight pounds; litharge, four pounds; water, a pint. When the water is all evaporated, suffer the mixture to attain a temperature at which fuliginous vapours arise,—remove it from the fire and gradually add water—constantly stirring until ebullition ceases, and if the plaster be not perfectly formed, repeat the operation. When the lard was boiled with water, something was taken up, and the remaining lard acting on the litharge much quicker than ordinarily would prove Chevreuil's view to be correct. The specimen of neutral plaster obtained by boiling the officinal article with caustic potassa, appeared to be margarate of lead. On thirty grains being treated with warm diluted nitric acid, and precipitated with iodide of potassium, it yielded twenty-six grains; from which take the iodine, and twelve grains of lead would remain; to which add sufficient oxygen to make the equivalent of litharge thirteen. Take this from thirty and seventeen remains, which corresponds nearly with an equivalent of margaric acid and water.

ART. LIII.—ON A VARIETY OF CINCHONA BARK.

By William Procter, Jr.

A few weeks since a sample of bark was sent to me for examination as to its quinia strength, which presented so many of the characters of yellow bark, that at the time it was not suspected. The sample, amounting to about half a pound, consisted of several pieces from two to five lines in thickness, four to eight inches long, and more or less curved. The epidermis had in most instances been removed with here and there prominent portions of a dark, reddish-brown colour. The interior surface was of a uniform, dull, brownish yellow, the fibres straight, and the terminal spiculæ less abundant than in the calisaya. The exterior was darker coloured than the interior layers, the whole being quite bitter to the taste, and auguring well for its quality.

After a careful examination, I was not a little surprised to find nearly three per cent. of cinchonia, and no evidence of quinia, even to the most delicate tests of that alkaloid.

On mentioning this result to MM. Rosengarten and Denis, they informed me that an invoice of bark from Peru had been consigned to them, as a new article, and which in their hands had not yielded any quinine. At my request, they kindly gave me a sample of the bark, and copies of letters, etc., giving a history of its introduction here and its origin in Peru, with permission to use them.

The consignment was from a house at Valparaiso, who say: "We received from Lima, from Dr. J. Villamil, twelve seroons of bark, requesting us to consign the same to the United States, that a correct knowledge may be obtained of the quality. This gentleman has a perfect acquaintance with the article, has been the chief collector and dealer in it for many years in Bolivia; and during his present resi-

dence in Peru, discovered that, in the interior, there, a similar and equally good quality of the calisaya bark [tree] of Bolivia was growing. The only difficulty being a perfect knowledge for the selection, which he possessing has dedicated himself to it, and selected these bales as samples, although a much larger quantity has been sent by him to England.

"Should the result prove favourable, Dr. J. Villamil will extend his transactions in it, and will be willing to receive orders for purchases, which, however, we should be rather scrupulous to execute, fearful from its being a new article that it might come rather mixed in quality, as it appears that both genuine and spurious grow in the same soil and places.

"However, you will be better able to judge from the result of the seroons, regarding it; and whether you should feel inclined to send orders for it through us; without, however, our responsibility for quality.

"We further add the certificate of an essay made in Lima showing the quantity of quinine it contains."

[*Certificate.*]

"LIMA, 8th October, 1846.

DR. VILLAMIL:

Dear Sir,—The Calisaya tabla bark which you are extracting from the woods of Guanuco, in Peru, of which you have sent me a sample, in order to analyse it, I find produced two and a half per cent. of sulphate of quinine, which I assure you for the best of your interests.

I am, dear sir, yours, &c.

(Signed,) J. JEMY, Sr."

A perusal of the above letter and certificate will induce the belief that the parties believed they had sent calisaya bark, which is corroborated by the testimony of the ana-

lysis, as well as the aspect of the drug itself. The seroons are of the usual size, weighing about 160 pounds, covered with raw hide. The bark is in pieces varying from three or four to ten or fifteen inches in length, two to four lines in thickness and various breadths, generally in narrow flattened pieces occasionally in rolled or quill form, and portions broken up by attrition or packing. The exterior surface varies in different pieces to a considerable degree. A very fine specimen in my possession has the reddish-brown epidermis remaining on parts of the surface which is fissured both transversly and lengthwise, with several lichenoid spots of a whitish colour. Where the epidermis has been removed, the colour is a uniform yellowish brown, somewhat orange, marked with scar-like impressions, as if the exterior bark had been pealed off by a natural process. The interior surface has a brighter colour, is smooth and the fibres are straight, and not interlaced, as often observable in calisaya. In other pieces the external surface retains nearly the whole epidermis, which is thin and of a greyish brown hue, whilst the interior surface has a dull ochre colour, having evidently less of the red colouring matter. The fracture of all the specimens exhibits yellow translucent spiculæ analogous in appearance to those of calisaya, but less numerous, and not capable of penetrating the skin like those of the latter bark, which is one of the best criteria for distinguishing them. The edge of the bark presents the crystalline points like the calisaya, which are less numerous. All parts of the bark are decidedly bitter, accompanied at first with an acid impression, and the odour is analogous to calisaya.

Chemical Examination.—1000 grains of the bark in question taken from a number of the pieces was exhausted by water acidulated with muriatic acid, and the clear hot infusion was precipitated with a slight excess of milk of lime; the precipitate, thoroughly washed and dried, weighed

190 grs. This was exhausted with alcohol 35° Baumé by boiling, and the alcoholic liquid, which had a light yellowish colour, was evaporated until crystals commenced to form, and set aside. Twenty grains of nearly colourless crystals were thus obtained, and the mother liquor, evaporated to dryness, afforded eight grains more of the same crystals contaminated with a small amount of extractive, being 2.8 per cent. altogether. The crystals were brilliant four-sided prisons with dihedral summits; had very little taste, but after a time gave an impression of bitterness; they are insoluble in water, soluble in alcohol, especially hot, and but slightly soluble in ether. They are strongly alkaline, and cold nitric and sulphuric acids dissolve without decomposing them. The sulphate, which crystallizes with great readiness, is soluble in water, has a bitter taste, and is precipitated by tannic acid. When dissolved in chlorine water, the addition of ammonia does not cause a green colour, indicative of quinia.

The decoction of this bark is precipitated by sulphate of soda, though not so abundantly as calisaya; it gives a dirty, greenish precipitate with persulphate of iron, a floculent white one with tincture of galls; tartar emetic instantly causes a white cloudiness, as also does oxalate of ammonia. When the filtered transparent infusion is dropped into a filtered solution of gelatin, the mixture becomes clouded, and, by standing, a very light floculent precipitate occurs.

The above results show that this bark is destitute of quinia, that it contains no aricina, and that it contains nearly three per cent. of cinchonia. The presence of this large percentage of alkali, and of kinate of lime renders all the ordinary chemical tests, as tincture of galls, sulphate of soda, etc., of little value, and in connection with the sensible characters of the bark is well calculated to deceive, as in fact nearly all of them agree with the calisaya. The character of the spiculæ noticed above, is the most striking difference,

and nothing but the actual, isolation of the alkaloid will render its non-identity with calisaya certain.

It is said that a lot of the same kind of bark has been examined in New York with a similar result, and as the letter before quoted states it has been sent to England, we shall probably hear of it from abroad.

Although coming from Guanuco, this bark is not by any means to be classed with the Guanuco bark of the books, although it is analogous to the latter in containing only cinchonia. Pereira states under the head of Huanuco bark, that "Ruiz, when appointed to examine a cargo of Huanuco bark in 1799, found a bark amongst it which Tafalla has designated as "*similar to calisaya*,"—and under the name of "*light calisaya*," Guibourt describes a variety of bark which in some of its characters is analagous to the one now noticed, but the history of the latter is sufficiently clear to render it probable that this is its first appearance in our market. The bark described at the commencement of this paper, is evidently from the same source in Peru, but was not a part of Messrs. R. & D.'s invoice.

ART. LIV.—ON THE FLUID EXTRACTS OF RHUBARB AND VALERIAN.

By William Procter, Jr.

The high and justly merited esteem in which Rhubarb is held, renders it a fit subject for pharmaceutic research. The modified character of most of the liquid preparations of this drug, as well as their feebleness, unfits them for many cases where it is applicable, and the only resource is the

powder; the well known nauseousness of which renders its avoidance often desirable.

In reflecting on the subject it occurred that a preparation might be made which should be liquid, nearly as concentrated as the drug itself, and sufficiently permanent to resist the temperature of our warm season.

In carrying out this idea, it has proved successful, and a preparation afforded containing the strength of sixty grains in a teaspoonful. Several advantages will result from this degree of concentration, besides that of permanency. It may be incorporated with liquid mixtures with the greatest facility, its syrupy consistence rendering it fit for suspending calomel or blue mass, and other insoluble substances, when these are prescribed with it; by dilution with simple syrup any required strength of simple syrup of Rhubarb can be prepared extemporaneously; and admixed with the fluid extract of senna, when the two cathartics are required together, it affords an excellent mode of administration.

In the following formula there has been no addition of aromatics to mask the taste, the sugar necessary for preservation being the only adjuvant. The active part of rhubarb is ceded equally to water and diluted alcohol, but the latter has been chosen as the menstruum because it enables the process to be conducted by displacement, and requires less heat and time in the evaporation.

Another reason is that whilst this menstruum extracts all the active part, it rejects a considerable amount of mucilage, which renders the preparation less viscid. If a watery menstruum is preferred, the best mode of extracting the root is to reduce it to small fragments or shavings, free from dust; then macerate it in twice its weight of water for twenty-four hours and strongly express. The residue is again macerated in the same quantity of water, and again expressed, until three times the weight of the root is obtained.

Take of Rhubarb root,	eight ounces,	(Troy.)
White sugar,	five ounces,	"
Diluted alcohol,	two pints.	

Reduce the drug to a uniform coarse powder, by grinding, if possible, and mix it with its bulk of coarse sand; moisten it with sufficient of the diluted alcohol to form a pasty mass, and allow it to stand for an hour, or until the particles are thoroughly impregnated and swollen with the liquid. The mass is then introduced into a displacer, and shaken until settled uniformly, covered with a piece of paper or cloth, and the rest of the menstruum carefully poured on until the passing liquid has but little odour or taste of the root, which is usually accomplished by the amount of menstruum indicated in the formula, if the percolation has been slowly effected. The concentrated tincture thus obtained is evaporated in a water bath until it measures five and a half fluid ounces, the sugar added, and when dissolved the whole should measure eight fluid ounces.

Fluid extract of rhubarb, made as above, has a dark colour in mass; is transparent in thin layers; has a strong odour and taste of the drug, somewhat modified by the sugar; and a thick syrupy consistence at the ordinary temperature, and has the specific gravity of 1.30. When mixed with water the solution is slightly turbid, owing to a little resinous matter.

In reference to its permanency it may be remarked, that the preparation has been kept for a month past, during the hottest weather, in the shop, without any evidence of change in appearance or odour, and its efficacy as a cathartic in the dose of half a teaspoonful has also been satisfactorily ascertained. The formula is offered, however, that it may be tried, and under the impression that, if no unforseen difficulty presents, it will prove a valuable agent in the hands of the practitioner.

Fluid extract of Valerian.—A formula for this prepara-

tion was published in the last number of this Journal, by Evan T. Ellis, which appears to have met with favour from those who have tried it, and it is certainly the best form of exhibiting this drug yet proposed. In some recent experiments on valerian root, I have been led to doubt the entire completeness of the formula alluded to, for the following reasons.

When valerian in powder is percolated with a mixture of one part of ether and two of alcohol, in such a manner that the menstruum shall pass slowly, and cease to extract matter from the root, it requires about three times the weight of the latter. If water is now added it is with great difficulty that it passes, if the valerian has been sufficiently fine for the first menstruum. When it has passed, the infusion has a very dark colour, and but little taste.

If now the ethereo-alcoholic liquid be suffered to evaporate spontaneously till it amounts to one half the weight of the valerian used, a quantity of green oily looking globules gradually separate, which attach themselves to the sides of the vessel, or float in the liqnid, which is a yellowish, strongly odorous fluid, having a decided acid reaction, and the bitter, disagreeable taste of valerian. If the globules are now separated by a filter they amount to about one fiftieth of the root used, and are in fact an oleo-resin, consisting of oil of valerian, valerianic acid and the soft resin proper to the drug. When brought in contact with litmus paper it instantly reddens it more decidedly than the liquid from which it was separated, especially if touched with a drop of alcohol. The dark aqueous infusion is now reduced to three times the bulk of the alcoholic fluid, by a careful evaporation, and mixed with the latter, which causes a turbidness which arises partially from the separation of resinous matter by the water, and partially from the precipitation of gummy matter by the alcohol.

From these facts it is evident that the whole of the active

principles of the valerian are not embraced in the preparation as published.

In one hundred parts, valerian contains about twelve parts of extractive matter, and eighteen parts of gum. It is questionable whether the extractive possesses any of the properties sought for in valerian, and the gum certainly does not. By using diluted alcohol instead of water, the extractive may be removed; the gum avoided; the imperfect extraction of the volatile and resinous principles by the first liquid compensated for, and a menstruum used capable of retaining all the active principles in solution.

The increase of alcoholic strength is not sufficiently great to injure the medical properties of the preparation as the dose is small.

In view of the above results, the following modification of Ellis' formula is suggested:

Take of Valerian Root,	eight ounces, (Troy,)
Ether,	four fluid ounces,
Alcohol,	twelve fluid ounces,
Diluted alcohol,	a sufficient quantity.

Reduce the valerian to coarse *powder*, and introduce it uniformly and without pressure into a displacing funnel. Mix the ether and alcohol, and allow the mixture to percolate slowly and regularly through the powder until all has been added. The diluted alcohol is then poured on until the ethereal menstruum has been displaced, which is known by the product amounting to nearly a pint. More diluted alcohol is now poured on until ten fluid ounces of liquid passes, when the operation is stopped. The ethereal tincture is placed in a shallow vessel, and suffered to evaporate spontaneously, till reduced to six fluid ounces. The clear liquid is then poured off and mixed with the ten ounces of tincture, and the oleo-resin adhering to the sides of the dish are dissolved in a little alcohol, and added to the rest. The mixing of the liquids, by changing the strength of the men-

truum, causes the separation of a little resin and oil, and a little extractive; and it is requisite that the mixture should stand, with occasional agitation, for three or four hours before being filtered, after which it should measure a pint.

When thus prepared, fluid extract of valerian is a dark brown transparent liquid, with the taste and odour of valerian strongly developed, and a decided acid reaction. One fluid ounce represents half a troy ounce of the root, which is the same proportion as in the published formula.

ART. LV.—NOTE ON THE TESTS OF THE PURITY OF BALSAM OF COPAIBA. By Mr. Redwood, Professor of Pharmacy to the Pharmaceutical Society.

Some observations which have recently been made at a meeting of this Society, with reference to the adulteration of copaiba, especially that used for filling the cheap capsules, have induced many of our members to examine their copaiba capsules with the view of determining whether or not the contents were genuine. In these examinations the ordinary tests, mentioned in works on Materia Medica, have of course been resorted to, and in some instances results have been obtained indicating, according to the tests used, that the copaiba was not genuine. I have been applied to for my opinion in two or three cases of this kind, and after examining several samples of copaiba obtained from different sources, and trying the action of all the tests upon them, I have come to the conclusion that no satisfactory method, applicable in all cases, for determining the purity or impurity of this oleo-resinous substance by the application of a

simple test, has hitherto been pointed out. Some of the tests, which appear to have been most relied upon, I believe to be quite valueless, and I have no doubt that many samples of copaiba have been condemned as impure on very insufficient data.

In obtaining the results which I am about to describe, I have used the following specimens of copaiba, but some of the experiments were repeated on several others:

1. Part of a specimen in our Museum, which was received about two years ago from one of our members, Mr. Goodbarn at Rio de Janeiro. It was taken by Mr. Goodbarn himself, from a tree in a primeval forest, in the district of Macahé, about four day's journey from the city of Rio de Janeiro, on the 5th of July, 1843. The tree was at the same time cut down, and some of the wood, bark, and leaves were sent with the specimen. On comparing these with Hayne's plates, they were found to correspond with those of Copaifera trapezifolia. Mr. Goodbarn described the tree as having been one hundred feet in height, and about three and a half feet in diameter. This is probably one of the best authenticated specimens of genuine copaiba in this country.

2. A specimen of copaiba taken from some capsules, said to have been imported from France. This specimen was brought me for examination by a merchant in the city. It had been previously examined and condemned as impure, but I believe it to be genuine and very good.

3. A specimen of good commercial copaiba obtained from a wholesale house.

The following are the tests which I have applied to these specimens, together with the results:

A. The addition of two parts of absolute alcohol to one of copaiba has been recommended as a means of ascertaining whether any substance insoluble in alcohol has been mixed with the copaiba. This is one of the tests given in

the *Edinburgh Pharmacopœia;* it is stated that genuine copaiba is perfectly soluble in the above quantity of alcohol.

On applying this test to the specimens, a perfect solution was formed with No. 1, but not with either of the others. After adding the alcohol, which was of specific gravity .795, to No. 2 and No. 3, a white floculent substance remained undissolved, and ultimately settled to the bottom. This substance was collected, and appeared on examination, to be the viscid resin of the copaiba, which, as met with in many specimens, is scarcely, if at all soluble, either in rectified spirit or in alcohol. I applied this test to several other samples of copaiba, which I believe to have been perfectly genuine, and obtained results similar to those afforded with Nos. 2 and 3.

The use of this test in the manner described may therefore lead to error, as it indicates the presence of impurity in cases where none exist. But this is not the only objection to this test. The evidence it affords of the presence or absence of substances which are insoluble in alcohol, is very imperfect. It is an error to conclude that a substance insoluble in alcohol, when added to that liquid alone, will therefore be insoluble if it be added when mixed with other bodies. The balsam of copaiba itself affords an illustration of this statement. This oleo-resinous substance consists principally of volatile oil and resin, which may be easily separated. The volatile oil is but sparingly soluble in alcohol, yet when mixed with the resin it is freely soluble. The same may be said of oil of turpentine and some of the fixed oils, which by themselves are either slightly or not at all soluble in spirit, but which, nevertheless, become freely soluble when mixed with other substances, such as camphor, resin, oil of lavender, and other volatile oils. Some of the resins, also, which, alone, are but little soluble in alcohol, may be readily dissolved when mixed with camphor, volatile oils, &c. The fact of an oleo-resinous substance being freely soluble

in alcohol, is therefore no proof that it contains nothing mixed with it which by itself would be insoluble, or but slightly soluble in that menstruum.

B. A solution of one part of hydrate of potassa in two parts of water has been recommended as a good test. It is stated that such a solution, mixed with nine parts of genuine copaiba, will form a transparent mixture, which will continue clear after moderate dilution with water or rectified spirit; but if there be from three to six *per cent.* of fixed oil present, the mixture will be opaque.

This test, when applied to sample No. 1, formed a mixture which continued opaque for several days; it then separated into two strata, the upper stratum being oily or saponaceous and clear, and the lower stratum aqueous, clear and colourless, and forming about one-tenth of the mixture. On shaking the tube, the mixture became again opaque; when diluted with water, it was rendered perfectly milky; the addition of spirit rendered it rather more clear, but left it still slightly opaque.

The same test, applied to specimen No. 2, formed an opaque mixture, which, after standing for some days, separated into three strata. The top stratum, constituting nearly one-half of the whole, consisted of the volatile oil of copaiba; the middle stratum appeared to consist of the resin and potash in the form of a soap; while the lowest stratum was aqueous, clear, and colourless. On shaking the tube, the mixture became again opaque, and this continued after dilution with water or spirit.

The same test, added to specimen No. 3, formed a mixture that was but very slightly opaque. No separation took place in it after standing for several days, but it still retained a slight degree of opacity. On adding a little more of the copaiba to the mixture, and shaking them together, it became perfectly clear, thus proving that the quantity of solution of potash first added was rather more than the copaiba was

capable of forming a clear mixture with. After obtaining the clear mixture in this way, it became quite opaque and milky on diluting it with water, and slightly opaque on adding spirit to it.

Finding that specimen No. 3 formed a clear mixture when rather less than the quantity specified of the solution of potash was added, I treated the other specimens with the solution of potash in several different proportions. No. 2 formed a mixture very nearly transparent, when only one-third of the specified quantity of the solution of potash was used; but a separation took place on letting it stand for some hours. No. 1, when mixed in this and several other proportions, still continued opaque.

It is very evident, therefore, that no satisfactory inference can be drawn, with reference to the purity of copaiba, from the application of this test.

C. Solution of ammonia of sp. gr. .960, has been recommended as affording a good test of the purity of copaiba. It is stated, that if one part of such solution of ammonia be added to three or five parts of genuine copaiba, the mixture will be clear, presenting a similar appearance to that of the copaiba before the admixture. If the mixture be opaque, it is said to be a sign of adulteration in the copaiba.

I believe this test has been more used and relied on than any other; but Dr. Christison has objected to it, on the ground that copaiba may be mixed with a sixth of its weight of castor oil without affecting the action of the test. I have found it liable to an objection of a different character, as the following experiments will show:

Specimen No. 1, when treated with the ammonia as directed, formed an opaque mixture, which continued so after standing for several days. The ammonia was added in a great many different proportions to this specimen, but in all cases the mixture was opaque.

Specimen No. 2, treated with the ammonia, formed at

first an opaque mixture; after standing for two or three days, it separated into three strata in the same manner as the mixture of the same specimen with the solution of potash.

Specimen No. 3, when treated in the same way, formed a perfectly clear and homogeneous mixture, which retained this character after standing for a considerable length of time.

This test, therefore, in addition to the objection stated by Dr. Christison, may indicate impurity where none exists.

D. Pure copaiba is said to dissolve a fourth of its weight of carbonate of magnesia, with the aid of a gentle heat, and to continue translucent, the presence of a small proportion of any fixed oil being indicated by the product being opaque. This, again, is one of the tests given in the *Edinburgh Pharmacopœia.*

This test was tried on specimen 1, 2, and 3, and the results were nearly the same in each case. After adding the magnesia, applying the heat of a water bath for about half an hour, and stirring the mixture from time to time, on allowing them to stand for a few minutes, a portion of the magnesia settled to the bottom of each of the tubes in which the mixtures were made. The fluid, or semi-fluid, portion might probably be said to be *translucent*, but I presume the test would leave as many degrees of impurity undetected as there may be degrees of translucency, for, surely, a more indefinite indication could hardly be conceived. After standing for several days, there was found at the bottom of each tube a saponaceous mass, constituting from one-third to one-half of the whole, and a clear oily fluid above. Specimen No. 3 gave the largest quantity of the saponaceous mass, and specimen No. 2 the smallest.

This test is as valueless as those previously noticed.

E. The last test to which I shall allude is probably the worst of all. It is stated, that if one part of oil of vitriol be triturated with three parts of pure copaiba, a plastic reddish

mass will be formed; but if the copaiba contains castor oil it will be scarcely or not at all coloured, and will acquire the consistence of turpentine.

I need hardly say that this statement is erroneous, and the test of no manner of value.

Having thus proved the worthlessness of these methods of detecting impurity in balsam of copaiba, it becomes an important question to determine whether there is any other less exceptionable method.

The consideration of this question involves a reference to the natural history and chemical composition of the different varieties of copaiba met with in commerce. What is the substance to be tested? Is it always the same, or do different specimens of it differ in their physical and chemical characters? The answers to these questions will be found to explain the discrepancies already noticed in the action of the foregoing tests on different samples of copaiba.

The substance called balsam of copaiba, is an oleo-resinous exudation, obtained from several species of the genus Copaifera, by making incisions into the trunks of the trees. It possesses most of the chemical characters of common turpentine. By distillation, or saponification, it may be resolved into a volatile oil and a hard resin. These exist in very different proportions in different samples of copaiba, depending, probably, upon the species of Copaifera from which it has been obtained, the soil and climate in which the trees have grown, and the length of time during which the copaiba has been kept. I have found the quantity of volatile oil to be twice as great in some samples as in others, and to this difference is chiefly to be ascribed the dissimilar action of the tests upon it. There is probably no simple test that could with any satisfaction be applied for the detection of impurities in a substance which is itself subject to such great varieties in composition.

The only method that appears to me to be at all satisfac-

tory, of examining a sample of copaiba, with the view of estimating its purity and value as a therapeutic agent, is, first, to resolve it into its proximate constituents, and then to examine these separately, with reference to their physical and chemical characters. The volatile oil is generally considered to be the principal, if not the only constituent of copaiba, which possesses any medicinal activity. This may be separated by distilling the copaiba with water, and its physical characters are so well marked, that it is difficult to conceive an adulteration that would not be readily detected. The resin would of course be at the same time separated by the above process of distillation, and the consistence and other characters of this part of the constituents of the copaiba will afford the best means of judging of the presence or absence of any non-volatile impurities.

The proportion of volatile oil, in different specimens of copaiba met with in commerce, is in some cases as low as 30, in others as high as 60 per cent. The specimens No. 1 and 2, alluded to in the foregoing experiments, contain nearly 60 per cent. of volatile oil; they are therefore unusually rich in the most active constituent of the copaiba. This volatile oil has the same ultimate composition as the oil of turpentine, with which it closely coincides in the action produced by most chemical agents; but its taste, smell, and other physical characters, afford means of distinguishing it from that or any other substance with which it is likely to be mixed.

The proportions of resin, in different specimens of copaiba, also vary to about the same extent as those of the volatile oil, the quantity being greatest where the quantity of oil is smallest, and *vice versa*. The resinous part of copaiba differs but little from common resin, obtained from turpentine. It is considered to possess but little medicinal activity, probably not more than common resin.—*Pharm. Jour.*

ART. VI.—ON EXTACT OF INDIAN HEMP. By Andrew Robertson, Esq., Professor of Chemistry to the Medical College, Calcutta. Communicated by Messrs. T. and H. Smith, of Edinburgh.

A number of pounds of the extract of hemp were prepared by me—I think upwards of thirty in all—for the purpose of having its medical properties fully tested by European medical men. A quantity went to Paris, another to Berlin, another to London, sent by different parties, and for my share of the matter I sent four pounds of it to Scotland, part of which went to you. I do not care about making more of it, as its preparation is most tedious and troublesome, in which I was tormented by the Excise regulations of the country, for both the plant and the spirits used are the subject of heavy duties and stringent precautions, and the cost price of the extract to me, counting nothing for trouble, was fully fifteen shillings per lb. Dr. O'Shaughnessy made his extract with alcohol, in a Papin's digester, at a heat above the boiling point of alcohol—the extract so obtained is brown; mine is of a deep green, and gives a grass green tincture to alcohol, and has six times the activity of the brown, as ascertained by trial on hospital patients. If a speedy effect is desired it is given as a tincture; if a deferred and protracted, as a pill.

As the process by which it was prepared is an idea of my own, since copied by others, and which probably may be claimed by them afterwards, I may mention it to you. It is a variation of the process of percolation, alcohol in vapour being the agent. A still was charged with strong spirits, and its nose introduced into the side of a cask in which the plant was pushed.

The vapour of the alcohol, and alcohol at a boiling heat

thus acted on the plant, instead of cold alcohol in the usual mode of percolation. First issued a thin tarry matter containing much resin, latterly, a brown liquor containing little resin but much extractive. At this point water was substituted for the spirit in the still, and as much as possible of the spirit retained by the plant thus expelled from it. From the bottom of the cask a pipe led to a common condensing worm. Part of the alcohol was recovered from the fluid by distillation, the rest dissipated by evaporation in Wedgewood ware on a sand-bath, not exceeding the temperature of 150° Fahr. One hundred weight of the plant was used at one operation, and about eight pounds of extract obtained. The operation was conducted so slowly as in all its stages to last a fortnight.*

The extract of hemp has been long known in the East in a most widely extended range of countries, under the names of Gunjah, Churrus, Hashish, Beng or Bang, the emerald cup of Haider, &c., and under every name renowned for its exciting and narcotic qualities. It is used by the natives here in the same way as opium is by the Chinese, and on that account is the object of fiscal regulations and duties. It is known throughout all India, Arabia, Syria, and Egypt. You will find it in the *Arabian Nights*, translated by Lane, under the name of Beng, as the narcotic used by Haroun Alraschid, and others. There cannot, therefore, be a doubt that it is a drug nearly as active as opium.

The inactivity of the drug, therefore prepared in Britain, I can attribute only to faulty preparation and overheating, or to its being made from old and decayed plants. The

* This plan of percolation by means of condensed vapour is the same in principle with that of C. A. Smith of Cincinnati, (see vol. 18th page 98 of this Journal) except that the latter has a condensing apparatus around the vessel containing the matter to be extracted.—W. P. jr.

good plant is of a greenish brown, the heads loaded with a sticky resin; the bad is palish brown and does not adhere to the fingers. The good extract gives a grass-green tincture, the bad a brownish. My extract was made from dried plants of good quality, as it cannot be readily obtained fresh in Calcutta.

Mr. Fordred stated, that it had recently come to his knowledge that some of the extract, sold in London as extract of Indian hemp, was made from the plant grown in the neighbourhood of London, and he believed it possessed but little, if any, of the narcotic properties of the Indian plant.* The extract made from the hemp (*Cannabis sativa*) grown at Mitcham, was of a green colour, and being apparently an aqueous extract contained but little resin, while that prepared from the plant grown in India contained a large proportion of resin. He thought it important, as many medical practitioners in different parts of the country were trying the efficacy of this remedy, that they should be cautioned to be particular in obtaining the extract of the *Indian* hemp.

Mr. Redwood said, that much of the extract made from the hemp plant imported from India, as well as the extract which had been imported ready made, was found to possess but little narcotic power when tried in this country; certainly they had not realized the expectations which were formed from the accounts of its action given by medical

*This statement accounts for the remarkable variableness of the commercial extract. A few months ago I had occasion to send two ounces of extract of Indian hemp to a practising physician in Mississippi, who wrote back that half an ounce of it produced no sensible effect analogous to the true drug, whilst two grains of another lot, since forwarded, was sufficient for a dose! May not the first article (which is known to have come from England) have been prepared from *English hemp plant*?—W. P. Jr.

men in India. Dr. O'Shaughnessy, when last in this country, had admitted that the extract, even some that he had brought from India himself, had failed to produce the effects he anticipated, when tried in our hospitals: and he had undertaken, on his return to India, to have some extract very carefully prepared, and sent over to this country. Mr. Squire had received a quantity of this extract, and he presumed it was that alluded to in the paper just read, as having been made by Mr. Robertson.

Mr. Bartlett had witnessed the effect of a very small dose of extract of Indian hemp, obtained from Mr. Squire, on one of his assistants, and the action was that of a powerful narcotic. The young man stated that he felt all the symptoms of intoxication.

Dr. Ure had been recommended the use of extract of hemp, by his son; but although he tried it for some time, he never experienced the slightest effect from it. The extract was the same as the above, having been obtained from Mr. Squire.

The Chairman thought that the present state of medical knowledge, in reference to the action of Indian hemp, was very unsatisfactory and imperfect.—*Pharm. Journ.*

ART. LVII.—QUERIES RESPECTING RHUBARB CULTIVATED IN THE NEIGHBORHOOD OF BANBURY, (ENGLAND.*)

1. How many persons cultivate rhubarb for medical use in the neighborhood of Banbury? State their names, and the number of acres occupied by each person.

2. For how many years has medical rhubarb been cultivated in that locality? What number of persons are employed in its cultivation and preparation for the market.

3. Is more than one species cultivated? If so, how many? By what names are they popularly distinguished? Specimens of all the species cultivated, either fresh or carefully dried, should be forwarded. The specimens should include *root*, *stem*, *leaves*, *flowers* and *seed*.

4. At what age and in what season is the root dug up for medicinal use? What are the uses respectively made of the root-stock and root-branches? Are both employed for yielding the medicinal rhubarb of the shops? Is the stick English rhubarb prepared from the root-branches?

5. Describe the mode of preparing the root for the market; including the cleaning, slicing, drying, and other operations. Is the root dried at ordinary temperatures in the air, or by the aid of artificial heat? If the latter, is it effected by the heat of a stove or a kiln; and at what temperature? What varieties are made of it in commerce, and what are the names by which these are known?

* The following queries and answers respecting English rhubarb were given and received by one of the Standing Scientific Committees of the Pharmaceutical Society of Great Britain. It is probable that a similar action on the part of our College would elicit much interesting information relative to some of our indigenous drugs. The collection of Seneka, Spigelia, Serpentaria, the cultivation and manufacture of the Castor bean, and various other subjects, might be illustrated by apothecaries resident in the regions where they grow, and such information communicated for this Journal would be particularly acceptable.—W. P., Jr.

6. What uses are made of the *leaves* and *leaf-stalks*? Are the latter sold for the table? Is wine ever prepared with them? If so, a sample to be sent. Is there reason to suspect that the leaves are used for adulterating tobacco?

7. Which is the principle mart for English rhubarb root? Is it entirely consumed in England, or is any of it exported? What is the average price of it?

8. Is rhubarb cultivated in other parts of England for medicinal use? If so, where and to what extent?

ANSWERS TO QUERIES RESPECTING THE CULTIVATION OF ENGLISH RHUBARB, NEAR BANBURY.

By Mr. William Bigg.

1. Three parties cultivate rhubarb root for sale, in the neighborhood of Banbury, viz. Rufus Usher, of Overthorpe and Bodicott; Thomas Tustian, of Milcombe; and Edward Hughes, of Neithorp. The exact number of acres is not known, but probably does not exceed twelve altogether. On some portion of such land other crops are occasionally grown.

2. The cultivation of rhubarb for medicinal use was first undertaken in this neighbourhood by a surgeon and apothecary, named Hayward, about fifty years ago. That gentleman died in the year 1811. His widow (of a second marriage) is living, and states that Mr. Hayward, having communicated the results of his experiments to the Society of Arts, in London, received from them two medals—one of gold, the other of silver. The number of persons employed in the cultivation, &c., does not, probably, exceed six or eight—men, boys, and sometimes women.

3. Only one species is in cultivation for medicinal sale; *Rheum Rhaponticum*. It has no distinctive popular name. Specimens of the seed and of the prepared root are forwarded. (The stem and leaf procured are decayed.)

4. The root is suffered to grow from three to four years

in the ground, and does best in a light sandy soil.* If it were allowed (if they could afford to let it) to grow longer it would be all the finer and better. It is dug up in the month of October, or sometimes November. The root stock is what they call "*trimmed*" in large pieces (as specimens sent.) The root branches ("*fibres*") go into the market as "*cuttings.*" The third form in which it enters into commerce is that of "*raspings,*" these being the produce of the process of "trimming." The cuttings are most likely to acquire the name of the "*stick English rhubarb.*"

5. The slicing, &c., I must defer till further information can be obtained, observing that I believe there is some precaution necessary in barking or stripping the root, so as not to pull off more than the true rind.

The root is dried in "drying-houses," heated by stove pipes or brick flues. The root when prepared for the drying house, is placed on a flat piece of basket work—some three feet long by two feet wide, and that is suspended by means of strings from above, over the pipe or flue—first at a considerable elevation (similar shelves containing root in a more advanced condition intervening), and gradually nearer as the process matures. There is great care requisite in conducting the process of drying—in *graduating* it; for if the root in a recent condition were subjected to the temperature to which it should be subjected in the final stage it would become unsaleable, and they say "black in the *inside.*" The "cuttings," "fibres," or root-branches, are pierced and strung, and so hung up in the drying-house. The trimmed are pierced only to give them uniformity of appearance with the foreign.

6. Of the leaves, I believe no use is now made, except the use common to all vegetable offal—manuring. The leaf stalks are now very partially sold for the table. In former

* Mr. Atkins, of Northampton, who is an authority on such things in general, says that a cool rich soil suits it best.

years, the sale of the leaf stalks formed a part of the trade, but it can scarcely be said to do so now. Wine has been occasionally made of them, but not to any important extent. Curious housekeepers here and there make a little to increase the variety of the table at the village "wake." The leaves were some years ago in demand (as I have reason to think) for the adulteration of tobacco, or the manufacture of cigars, but are not at present.

7. The principal, and with a small exception, the only mart for English rhubarb root is London. It is there purchased by the wholesale druggists, who would probably state that a great part of it is subsequently exported. Some of it is sold no doubt to the Jews and Turks *as English*, but I strongly suspect that a much larger portion is sold to the Christians as *foreign*.

The "cuttings" make, I dare say, a very decent powder, mixed according to conscience with East India Rhubarb. The price is variable, and though I have often in the course of the last ten years heard it quoted, I cannot trust my memory for a figure.* The "trimmed" is of course the highest —from two-thirds more to double the price of the "cuttings."

I have heard it stated on computation that not less than about twenty tons are, in the various forms described, annually sent into the market.

8. I know of no other place in which rhubarb is grown for medical purposes in a wholesale way. A field of rhubarb when in flower—the stalks from six to ten feet in height—has a very striking appearance, and cannot be passed without observation.

The leaf-stalk grown in private gardens is not unfrequently preserved with sugar, and is recommended in that form by Dr. Kerr, of Northampton as a laxative.—*Pharm. Journ.*

* The large pieces fetch more, in proportion to their sizes. The prepared root is rubbed over with powder, and sometimes when damp with ochre.

ART. LVIII.—ON THE PREPARATION OF LACTIC AND BUTYRIC ACIDS.

By A. Bensch.

In the preparation of lactic acid according to the process of M. Gobley, there is nothing to show when the metamorphoses of the sugar into lactic acid has been effected, as he employs so much water that the lactate of lime formed remains almost wholly in solution. But since the formation of butyric acid begins as soon as the production of lactic acid is terminated, a great loss of lactic acid may readily occur, which may be easily prevented by using a smaller quantity of water. The addition of tartaric acid to the solution of sugar, in order to convert the cane into grape-sugar, and the addition of stinking cheese, facilitates the formation of lactic acid, and prevents the contemporaneous production of large quantities of butyric acid.

The circumstance that the lime-salts prevent the separation of the otherwise so sparingly soluble salts of zinc and protoxide of iron, does not allow of the employment of the lime-salt in the preparation of the above salts; and I therefore prefer decomposing it with sulphuric acid, and combining the lactic acid with oxide of zinc, as the purification of the lactate of zinc and the separation of the lactic acid from it present no difficulties. The mixture which I use for the preparation of lactic acid is essentially the same as that employed by Pelouze and Gelis for the preparation of butyric acid.

Lactic Acid.—6 lbs. of cane-sugar and ½ oz. of tartaric acid are dissolved in 26 lbs. of boiling water, and set aside for some days; upon this, 8 oz. of old stinking cheese, well diffused in 8 lbs. of curdled acid milk from which the cream

has been removed, are added to the above mixture along with 3 lbs. of finely-powdered chalk, the whole located in a warm place, so that the temperature of the liquid is from 86° to 95°. It is well stirred every day several times; in the course of 8 to 10 days the entire mass solidifies to a stiff paste of lactate of lime; 20 lbs. of boiling water and ½ oz. of caustic lime are added to this paste, boiled for half an hour, and filtered through a linen bag. The liquid is evaporated to the consistency of a syrup, set aside for four days, in which time the lactate of lime has separated in a granular crystalline form; it is expressed, then agitated with one-tenth its weight of cold water, again submitted to pressure, and this operation repeated two or three times.

The lactate of lime, after being expressed as well as possible, is dissolved in twice its weight of boiling water; and for every pound of expressed lactate of lime, 3½ oz. of sulphuric acid previously diluted with its weight of water added to the solution. The hot liquid is immediately filtered through a conical bag from the gypsum, and boiled with 1⅛ lb. of carbonate of zinc for every 1 lb. of sulphuric acid used for a quarter of an hour; if boiled longer, a very insoluble basic salt is formed. The solution, filtered boiling hot, soon deposits perfectly colourless lactate of zinc in crystalline crusts, which may be obtained perfectly free from sulphuric acid by rinsing with cold water. The mother-ley is again boiled with any of the salt which may have remained on the strainer, or concentrated by evaporation. It yields, nearly to the last drop, perfectly white zinc salt.

To separate the lactic acid from this salt, I dissolve it in 7½ parts of boiling water, pass a current of sulphuretted hydrogen into the hot liquid until it has become cold, and no further separation of sulphuret of zinc is perceptible. The liquid filtered from the sulphuret of zinc is boiled to expel the excess of sulphuretted hydrogen, and then evaporated in a water-bath to the consistence of a syrup. 8 parts

of lactate of zinc yield in this manner 5 parts of perfectly pure syrup lactic acid.

Butyric Acid.—When the above mixture of sugar, chalk, &c. is left longer than ten days at 95°, and the evaporated water renewed, the mass again becomes liquid, gas bubbles are given off, and in from five to six weeks the lactic acid is converted into butyric acid, and the evolution of gas ceases. The liquid is now mixed with an equal volume of cold water, and a solution of 8 lbs. crystallized soda added; the corbonate of lime collected on a filter, and well washed; the liquid evaporated to 10 lbs., and mixed cautiously with 5½ lbs. of sulphuric acid, which has previously been diluted with an equal weight of water. Butyric acid separates as a dark-coloured oily layer upon the solution of the bisulphate of soda, and can be readily separated by a separating funnel. The solution of bisulphate of soda is submitted to distillation, the product saturated with carbonate of soda, the butyric acid likewise separated after evaporation by sulphuric acid, and the crude butyric acid rectified, after the addition of 1 oz. of sulphuric acid for every pound, in order to prevent the separation of anhydrous sulphate of soda, which would cause a violent thumping. The dilute rectified butyric acid is saturated with fused chloride of calcium, which separates the acetic acid, and then again submitted to distillation. The first portion that passes is dilute butyric acid containing traces of muriatic acid; this is succeeded by concentrated butyric acid, and there is left in the retort a small quantity of chloride of calcium and brown-coloured butyric acid.

Pelouze and Gelis distilled the crude butyrate of lime with muriatic acid; this operation requires very large retorts, as a violent frothing is unavoidable; moreover, by this method the butyric acid is rendered very impure by muriatic acid, two evils which are avoided by the method I have proposed. I obtained from 6 lbs. of cane-sugar 28 oz. of pure concentrated butyric acid.—*Ch. Gaz., from Liebig's Ann·*

ART. LIX.—ON THE PREPARATION OF INDIA-RUBBER BY VULCANIZATION AND CONVERSION.

By Mr. Brockedon.

Mr. Brockedon's object in this communication was to describe, —1st, a mode of treating India-rubber by which new properties are imparted to this substance; 2d, the new uses in the arts to which these acquired properties now render India-rubber applicable. *Vulcanization* and *conversion* denote that combination of India-rubber with sulphur from which the new properties about to be described result. The process of conversion consists in submitting India-rubber to the action of bisulphuret of carbon mixed with chloride of sulphur. The caoutchouc cannot, however, be penetrated by this process to any depth; and therefore it is inapplicable when the mass to be acted on is thick. The process of *vulcanization*, which seems to be more applicable, is the result of many experiments made by Mr. Hancock; who found that caoutchouc, when immersed in a bath of fused sulphur, heated to various temperatures, by absorbing the sulphur, assumed a carbonized appearance, and lastly acquired the consistency of horn. It was in the course of these changes that it attained the state of vulcanization which Mr. Brockedon afterwards described. The same vulcanized condition can, however, be produced either by kneading the India-rubber with sulphur and then exposing it to a temperature of 190°, or by dissolving the India-rubber in any known solvent, as turpentine, previously charged with sulphur. Having thus explained the processes, Mr. Brockedon described the effect which they produced on the caoutchouc:—1st, the India-rubber, thus treated, remains elastic at all temperatures; in its ordinary state it is quite rigid at a temperature of 40°; 2d, vulcanized caout-

chout is not affected by any known solvents, as bisulphuret of carbon, naptha, or turpentine; 3d, it is not affected by heat short of the vulcanizing point; 4th, it acquires extraordinary powers of resisting compression. Thus, a cannon-ball was broken to pieces by being driven through a a mass of vulcanized caoutchouc—the caoutchouc itself exhibiting no other trace of its passage than a scarcely perceptible rent. The applications of this substance appear to be almost infinite. Our readers are familiar with the usefulness of the "elastic bands;" but they may not be aware that the same fabric, adjusted in size and strength to the purpose required, furnishes springs for locks and for the racks of window-blinds. It is also capable of being moulded into the most intricate ornaments; its characertistic elasticity removing all embarrassments in relieving the undercut parts. It furnishes impervious bottles for volatile substances, like æther; as well as an excellent ink-stand. It is adapted to protect from corrosion, wires subjected to the action of the sea, as is the case of the wires required for the projected electric communication between England and France. For the same reason, air-tubes of vulcanized rubber are better suited for life-boats than those formerly made of canvass, which are liable to be destroyed by the action of the water. A similar tube has been used with success as a substitute for an iron band as the tire of a carriage-wheel; and it is stated that a vehicle so arranged runs much easier than on the present plan. But perhaps the most important application is in its use in railroads and railroad carriages. In the former, it is laid between the rail and the sleeper, and thus prevents the rails from indicating any traces of the pressure; and the springs connected with the buffers of the latter, when formed of vulcanized caoutchouc, can neither be broken, nor can their elasticity be surmounted by any degree of concussive violence. In conclusion, Mr. Brockedon exhibited objects illustrative of

the great physical change induced on caoutchouc by vulcanization. He showed a screw, with its recipient, both made of this substance, as well as a form of letter-press (like a stereotyped page) for printing. He also noticed its usefulness in making epithems for surgical purposes, gloves and boots for gouty persons, &c.—*Chem. Gaz. from Proceedings of Royal Institution.*

ART. LX.—PHARMACY IN SPAIN.

By M. Orfila.

There are in Spain two pharmaceutical faculties, one in Madrid, the other in Barcelona; the title of Doctor in Pharmacy is, however, granted only in Madrid. For the faculty of Pharmacy, there is in Madrid a large and noble building, containing rooms for the different offices, lecture rooms, apartments for the meetings of the faculty, public *concours*, &c., as well as for the different mineralogical, zoological, chemical, and pharmacological collections. There are besides several laboratories, one of which, under the direction of Professor Camp, is especially intended for the use of the students of the pharmaceutical department during their course of studies. With regard to the botanical garden belonging to the faculty, Orfila observes, that it is not sufficiently ample, and the students of Pharmacy are consequently under the necessity of proceeding to the Royal Botanical Garden, which is however at once the pride and ornament of the metropolis.

The whole course of pharmaceutical studies occupies, like

that of medicine, nine years; that is, in case the candidate aspires to the rank of Doctor in Pharmacy. The majority of students are however satisfied with the degree of Licentiate of Pharmacy, to obtain which, only seven years study are necessary. This degree ranks with that of Licentiate in Medicine, and entitles the possessor to practice Pharmacy throughout the whole kingdom; while the doctors of Pharmacy are, in addition to this, qualified for the public offices of instruction, such as *Agrégés* and Professors in Pharmacy.

At the expiration of the fifth year, every student in Pharmacy is expected to pass an examination as *Baccalaureus pharmaciæ*, which title is merely honorary, and does not allow of his practising Pharmacy independently. In order to be enrolled among the students of Pharmacy a good education is indispensable, and candidates are required to pass the *examen philosophicum*, besides devoting at least one year to the study of general chemistry, mineralogy, zoology, and botany. After these preliminary examinations, the student commences at the College during

The First Year.—Special mineralogy and zoology, with reference to Pharmacy and description of pharmaceutical preparations, three times a week, under Professor Lallana.

Second Year. — Pharmaceutical botany and Materia Medica, with special description of the plants used in Pharmacy, three times a week, under Professor Leon.

Third Year.—Chemistry of inorganic substances and pharmaceutical chemistry, three times a week, with Professor Ximenes.

Fourth Year.—Chemistry of organic substances and chemical Pharmacy, three times weekly, with Professor Rioz.

Fifth Year.—Practical instruction in all pharmaceutical operations, with Professor Camp.

Sixth and Seventh Years.—Pharmaceutical practice in a dispensing establishment.

Eighth Year.—Chemical analysis of alimentary substances, drinks, mineral waters, poisons, &c., with Professor Pow, who likewise directs the studies of the medical students in this particular branch.

Ninth Year.—Bibliography, history, and literature of medicine and pharmacy, by Professor Asuero of the faculty of medicine.

According to Orfila, the professors of pharmacy, like those of medicine, lecture without notes, and distinguish themselves by a profound knowledge of their profession. With regard to the course of pharmaceutical studies, he remarks that greater attention seems to be bestowed upon the theoretical than the practical education, and that the materia medica, practical pharmacy, and toxicology, appear somewhat neglected when compared with other branches. There is in this respect a striking contrast between the system of pharmaceutical education in Spain, and in this country. In Spain, too little attention is paid to practical pharmacy, while, in Great Britain, the theoretical education of pharmaceutists is (so far as the legislature is concerned) entirely neglected. The preliminary liberal edudation, strictly enforced in Spain before the students of pharmacy can be enrolled before the faculty, is, we think, highly creditable to the Spanish profession, and is, to a certain extent, worthy of imitation in this country. The entire course of study at the Spanish institution (nine years) is prolonged to an unnecessary extent. Supposing the preliminary examination to be passed at the age of sixteen or seventeen, a course of pharmaceutical studies extended over four or five years, including the time occupied in the shop, would be, in our opinion, quite sufficient to enable the student to qualify himself for a good practical examination in pharmacy. Orfila seems to think that a period of eight years ought to be allowed for the qualification, and that the student should begin with the theoretical portion, and oc-

cupy the sixth and seventh years in the dispensary, to obtain a knowledge of the practical part of his profession. In Buchner's *Repertorium für die Pharmacie* quite a contrary view is taken, and the German system of commencing with the practical part is defended. The writer in the *Repertorium* thinks that the student of pharmacy, after five years studies at the university, will scarcely be induced to accommodate himself to the dry and often disagreeable duties of the shop. We consider that the two departments of the pharmaceutical education ought to be continued together. The neglect of either the theoretical or practical portion, must of necessity detract from the efficiency of the pharmaceutical Chemist.

All students should attend a regular course of lectures, as well as of practical chemistry in proper laboratories, at the same time keeping in view the necessity of unremitted attention to the ordinary duties of the profession from which they are to derive a subsistence.

At the expiration of each year the student in Madrid is examined by two professors and one *agrégé*, as to his progress during the year. At the licentiate examination at the end of the seventh year the candidate is examined *orally*, in *writing*, and also practically in *chemical analysis*. The examination is quite as severe as that for the corresponding degree of licentiate in medicine. The examination for the degree of Doctor in Pharmacy is passed by comparatively few persons, the ordeal being very severe, and the vacancies at the faculty occurring at rare intervals. The pharmaceutical faculty in Madrid consists of the above-mentioned six professors and three *agrégés*, or assistant professors. Of the latter, one acts as secretary to the faculty, another as librarian, and the third as director to the laboratory. In 1842, the number of students of pharmacy registered by the faculty was 650, in 1843 it had increased to 780.

The fees are as follows:

Registration for first year - -	55	Francs.
Total for the five following years -	275	"
Degree of Bachelor of Pharmacy -	125	"
——— Licentiate - - -	750	"
Total -	1205	"

(Or rather more than £48 sterling.)

The degree of Doctor of Pharmacy, *rarely taken* - - -	750	"
	1955	"

(Or about £78 sterling.)

The above abstract of the papers on medicine and pharmacy in Spain, by Orfila, has reference to the state of these sciences subsequently to the reform of 1835. Prior to that period the medical institutions of the kingdom were submitted to a board of medicine, appointed by the minister or by the crown, and subject to all the inconveniences attending a close connection between science and power. The distinction between physicians and surgeons was rigidly observed, and government situations given to the most subservient. The physicians in Spain seemed inclined to be more liberal than their opponents the surgeons, and with few exceptions joined the constitutional party of 1820. Upon the overthrow of this party in 1823, King Ferdinand revenged himself upon the liberal physicians by a decree converting surgeons into physicians, surgical colleges into medico-chirurgical, and granting the title of *medico-cirujanos* to a great number of young surgeons and students. No physician was permitted to enjoy any medical post at court, or in any of the public establishments, hospitals, &c. This state of affairs lasted quietly until the death of this medical reformer, when a contest arose between the physicians and medical colleges or surgeons appointed by Ferdinand. At

length, by a royal decree of Christina, a medical commission of five members was appointed to consider the state of medicine in the kingdom and to draw up a plan for the necessary reform. The result of their deliberations has been briefly given in this paper and may propably be interesting to the medical reformers of our own country.

Preamble to the Royal Decree, appointing a Commission of Five Persons with a Secretary, to consider and report upon the modifications necessary for the Medical Reform in Spain.

"Animated by pure zeal for the preservation of the Public Health, and convinced of the necessity of rendering uniform the studies which are the basis of the healing art in all the Colleges and Universities now existing, or which hereafter may be founded in the kingdom; persuaded also of the advantage of duly honouring those who dedicate themselves to a profession as noble as it is necessary; I have thought well to institute a Commission, which may examine and propose to me such changes as the laws now in force may be susceptible of, and of whatever else, in the opinion of the Commission may contribute to the lustre of the Profession and the welfare of the Public."—*(Bulletin de Medecina, Cirugia, y Farmacia, Madrid,* 1835, *from Gaz. Med. de Paris and Jour. de Pharm.) Pharm. Jour.*

ART. LXI.– EXPERIMENTS ON THE DETECTION AND QUANTITATIVE DETERMINATION OF STEARINE AND STEARIC ACID IN WAX.

By E. Geith.

Carbonate of soda affords a ready method of detecting the adulteration of wax by stearic acid. When pure white or yellow wax is boiled in a porcelain dish with an equal weight of carbonate of soda and 6 parts of water, constantly stirring until a layer of carbonate of soda begins to form at the bottom of the dish, a tolerable quantity of the wax itself is saponified. If the mass, while still hot, is treated with 6 times the weight of the wax of alcohol of 0.80 spec. grav. and the whole then rubbed to a powder, with a gradual addition of from 16 to 18 parts of alcohol of 0.50 spec. grav., until the insoluble portion remains suspended in the liquid, a considerable precipitate is produced in the filtered solution by an acid. When, therefore, wax is tested with carbonate of soda for stearic acid, this substance saponifiable by soda must be previously extracted, which may be done with alcohol. In examining wax, it should first be tested for stearic acid; about 2 drms. of the sample to be examined are digested for some time in a flask with 1 oz. of lime-water and 1 oz. of distilled water, when the liquid, if stearic acid be present, loses its alkaline reaction. Regnault has, it is true, asserted that a precipitate of stearate of lime is deposited from the liquid, but the author was never able to obtain any such precipitate; on the contrary, even turbid lime-water became clear on digestion with the wax. When the absence of stearic acid has been thus ascertained, 1 drm. of the sample of wax is boiled for a few minutes in a flask with 2 oz. of alcohol of 0.80 spec. grav., and the whole poured into 1 oz. of alcohol of the same strength; after a few hours the finely-divided wax is collected on a filter and washed with 2 ounces of the same alcohol. The wax

on the filter is pressed between two porous tiles till nearly dry; it is then carefully transferred into a porcelain dish, and boiled with 1 drm. carbonate of soda and 6 drms. of distilled water, stirring the whole time, until some carbonate of soda begins to form on the bottom of the dish; 1 oz. of alcohol of 0.80 is added to the warm mass, and the mixture stirred gradually, adding some ounces of alcohol of 0.50, until the insoluble portion is converted into fine powder. When it has become perfectly cold, it is poured upon a filter, and edulcorated with alcohol of 0.50, until acetate of lead no longer produces any opacity; the whole is then evaporated to 1 oz. The residue is filtered when cold, and washed with weak spirit. The liquid which passes is well shaken in a phial with 2 to 4 per cent. of stearic acid or stearine, a considerable froth is formed, which persists from half an hour to an hour; with pure wax the frothing is very slight, and it soon disappears. To further test the liquid, an excess of acetic acid is added to it; if the wax was pure, there is at the utmost only a faint opalescence; but if it contain stearine or stearic acid, a precipitate is formed, especially on shaking. If it is desired to determine the amount of these impurities, the liquid is not treated with acetic acid, but with acetate of lead, as long as a precipitate is formed, and the liquid then acidified with acetic acid. When the precipitate has subsided, it is collected on a weighed filter, and washed with distilled water until the liquid which passes through is no longer coloured by sulphuretted hydrogen. If the wax was pure, the quantity of the precipitate from 1 drm. only amounts from one-half to two-thirds of a grain; if it contained 10 per cent. stearine, it amounts to 2 to 2½ grs. The quantity of the precipitate is not constant, and it is far more easy to determine the stearic acid than the stearine, for with 5 per cent. of the former the precipitate amounts from 2 to 2⅔ grs. M. Buchner states, in a note to the above paper, that he has convinced himself of the practicability of the above method.—*Chem. Gaz., from Buch. Rep.*

ART. LXII.—ON ARTIFICIAL BLUE COPPER, (COPPER-INDIGO.)

By A. and C. Walter.

The monosulphuret of copper, hitherto artificially obtained either by precipitating persalts of copper with sulphuretted hydrogen or by treating the sesquisulphuret of copper with cold concentrated nitric acid, is generally not blue like copper-indigo, but dark-green or brownish-black; if, however, the precipitate obtained with sulphuretted hydrogen is dried at a moderate temperature, it frequently yields a greyish-black powder, which under a steel polisher, gives a faint steel-blue streak, especially when it is fixed by means of size upon paper, and after drying burnished with the polishing steel. According to the observations of Covelli respecting the formation of blue copper at Vesuvius, it appears as if it were produced by the long-continued action of sulphur upon persalts of copper; and the authors therefore attempted to prepare it in a similar manner. After numerous experiments, they found the following process to be the most advantageous :—Pure sulphate of copper is dissolved in hot water, dilute solution of caustic potash or soda added to it until nothing further is precipitated; the precipitate is then washed in hot water, and dried at a high temperature, until the entire mass has become converted into black oxide. 1 part of this oxide is now heated in an open dish with 1 part sulphur and ½ part chloride of ammonium until the sulphur takes fire; while the sulphur burns, the mixture is well stirred, covered from time to time with a loose lid, removed from the fire for a time, and a fresh quantity of 1 part sulphur and ½ part chloride of ammonium added, the dish covered and again exposed to a gentle heat. When the dish has been left covered for some time, it is re-

moved from the fire and allowed to cool and the lid taken off, when, if the right time has been hit, a portion of the sulphur will be found sublimed, and this should then be furthered by gentle heat. If the mass does not possess a dark blue, but still a black colour, it must be mixed with more sulphur and chloride of ammonium, and heated as above, constantly taking care, however, that the temperature is not too high; it is on that account advisable to add from time to time fresh portions of powdered chloride of ammonium. The indigo-blue or dark-black powder thus obtained is now finely ground, and washed with a sufficient quantity of water to remove all chloride of ammonium; to get rid entirely of the sulphur, the well-washed powder is boiled with a strong solution of potash or soda until no more sulphur is removed. It is frequently requisite to wash the compound, which has been well exhausted with boiling ley, and to treat it with fresh ley. The mixture might also contain undecomposed oxide of copper, which could be removed by digestion with caustic ammonia, but not without occasioning some loss of sulphuret of copper. However, when the operation is well conducted, especially with repeated additions of sulphur and chloride of ammonium, no such impurity will easily occur. The residuous mass is now well-washed with water, to remove all adherent potash and soda. The sulphuret of copper so obtained forms an indigo-blue or blackish blue dull powder, which when burnished with a polishing steel assumes a beautiful steel-blue tint. Ground up with oil or varnish, it affords a beautiful violet-blue. It can be prepared equally well from metallic copper, or by mixing the dry monosulphuret of copper with sulphur and chloride of ammonium, and treating it as above directed. Carbonate of copper would answer equally well, as also the nitrate, but not the chloride.

The compound described exhibits the same behaviour as the monosulphuret obtained by precipitating persalts of

copper with sulphuretted hydrogen; but it is not dissolved so easily by cyanide of potassium or sulphuret of ammonium; but it dissolves readily in ammonia when air is allowed access, forming ammoniacal oxide of copper and depositing sulphur. The authors have not yet made any analysis of this compound, but it is very probable that its composition is identical with that of blue copper. It is more difficult to answer the question whether it has the same composition as the bluish sulphur compound prepared by Winkelblech. The samples made by the authors, according to the method described by Winkelblech, did not possess the beautiful blue colour of the compound described.—*Ib.*

ART. LXIII.—ON CITRATE OF MAGNESIA, AND A PURGATIVE WATER MADE WITH THIS SALT.

By M. Roge Delabarre.

On making some experiments with the salts of magnesia, I had occasion to observe that the citrate of magnesia is devoid of the bitter and disagreeable taste which characterize the other soluble salts of this base.

This result, which at first surprised me, appeared less extraordinary on considering that of all the soluble salts of iron, the citrate is almost the only one which is free from the particular taste that distinguishes the ferruginous salts.

Experiments founded on these observations, led to the conclusion that these facts, so far from being exceptions, may be taken as illustrations of a law which may be thus generalized:—That, *of all the salts of any base, the citrate*

is that in which the taste peculiar to the base is to the greatest extent lost.

Citric acid, which appears to have the property of thus modifying the taste produced by the base with which it may be combined, is obtained in several states. It contains sometimes three, sometimes four, and sometimes five atoms of water.

According to Liebig, the formula for citric acid, such as it is met with in combination with oxide of silver, is $C_{12}\ H_5\ O_{11}=\overline{Ci}$.

Crystallized citric acid, dried at 212°, contains $C_{12}\ H_5\ O_{11}+3\ H\ O=\overline{Ci}+3\ H\ O$.

If it be crystallized from a boiling solution, it will contain $C_{12}\ H_5\ O_{11}+4\ H\ O$; and if crystallized by spontaneous evaporation at 68° Fahr., its composition will $C_{12}\ H_5\ O_{11}+3\ H\ O+2\ H\ O=Ci+5\ H\ O$.

Citric acid is a tribasic acid, it forms with bases neutral salts, acid salts, and basic salts.

In the neutral salts, each atom of acid is combined with three atoms of base. These salts are represented by the following formula: $\overline{Ci}$, 3 M O + Aq. Their composition, is, therefore, analogous to that of the acid, with four atoms of water. The water of hydration in these salts may be replaced by an atom of metallic oxide, when basic salts are formed. These have an atom of water of crystallization, which they lose at common temperatures, as the salt of silver, or at a higher temperature. They are therefore analogous to the acid with five atoms of water. The composition of the basic salts when dried, is $\overline{Ci}$, 3 M O + M O.

The citrate of magnesia, which forms the subject of this notice, is a salt but little known, being scarcely mentioned by chemists. Liebig, in his *Traité de Chimie Organique*, merely says, "Magnesia, alumina, and protoxide of manganese, form, with citric acid, neutral insoluble salts, and soluble salts which are acid."

Berzelius, in the eighth and ninth volumes of his *Traité de Chimie*, which treat of the salts of magnesia, mention the oxalate, the acetate, and the tartrate, but not the citrate. In his theory of chemical proportions he gives the following composition for the citrate:—Magnesia, 26.12; citric acids 73.88; but no account is here taken of the water of crystallization, which the salt contains.

Citrate of magnesia may be obtained in two different ways. It may be made by double decomposition from sulphate of magnesia and citrate of soda, or by saturating a solution of citric acid with magnesia or the basic carbonate. If it be prepared by saturating a solution, somewhat concentrated, of the acid, the liquor which is at first liquid and transparent, becomes in an instant a hard mass, adhering strongly to the sides of the vessel in which the combination is effected. This arises, probably, from the water which at first holds the salt in solution, passing to the state of water of hydration.

The neutral citrate of magnesia, prepared by either of the processes above described, is a white pulverulent insipid salt, soft to the touch, heavier than magnesia, and soluble in water aided by the addition of a slight excess of the acid. This solution has a slightly acid taste, but is in no way disagreeable.

A small quantity of the citrate of magnesia having been put into a glass tube and heated over the flame of a lamp, aqueous vapour was disengaged and condensed at the other end of the tube. On further heating the tube, white inflammable vapours were given off, in which carbonic oxide and acetic acid were distinguished.

One gramme of citrate of magnesia, dried *in vacuo*, and then strongly calcined in a porcelain capsule, left a white residue, consisting of pure magnesia, and the weight of which was 0.170.

Citrate of magnesia may, therefore, be considered as having the following composition:

1 eq. Citric acid, . .	2511.25	55.3
3 eq. Magnesia, . .	774.00	17.2
1 eq. Water of Constitution,	112.50	2.5
10 eq. Water of Crystallization,	1125.00	25.0
	4522.75	100.0

There is the same quantity of oxygen in the water present as in the acid.

I propose the following preparation for the administration of citrate of magnesia:

SEIDLITZ WATER FREE FROM BITTERNESS.*

Or, Purgative Mineral Water of Citrate of Magnesia.

No. 1 (mild.)

	grammes.		grains.
Citrate of Magnesia, . .	40	=	617.360
Citric Acid, ...	2	=	30.868
Simple Syrup, ...	125	=	1929.252
Essence of Orange, . .	q.s.		
Water charged with Carbonic Acid,	q.s.		

to fill a common mineral water bottle, containing 750 grammes (about the size of a wine bottle.)

No. 2 (strong.)

	grammes.		grains.
Citrate of Magnesia, . .	50	=	771.701
Citric Acid, ...	2½	=	38.585
Simple Syrup, . . .	150	=	2315.103
Essence of Orange, . .	q.s.		
Carbonic Acid Water, . .	q.s.		

for a wine bottle.

The following is the formula for making 100 bottles of

* The common *seidlitz water*, as made on the continent, contains sulphate of magnesia.

the above, each containing 50 grammes, or 771 grains of the citrate:

Dissolve 6 pounds 9 ounces and 364 grains (avoirdupois weight) of crystallized citric acid in 22 pounds of water, and add to the solution 1 pound 5 ounces and 83 grains (avoird.) of calcined magnesia. When the combination has been effected, filter the solution, and add to it 33 pounds (avoird.) of simple syrup flavoured with essence of orange. Distribute this solution in one hundred wine quart bottles.

Then—

Precipitate 2 pounds 10 ounces and 145 grains (avoird.) of sulphate of magnesia, with a sufficient quantity of carbonate of soda, in the usual way; wash the precipitate, put it into a proper apparatus, with about 90 pints of water, and pass carbonic acid through it until the magnesia is dissolved. This being effected, use the solution thus formed to fill up bottles into which the previous solution has been put.

Report by Messrs. Renauldin and Soubeiran on the above Mineral Water.

The proportion of magnesia in the citrate is sensibly the same as that in an equal weight of the crystallized sulphate, but the former salt is not so powerful in its medicinal effects as the latter, the fifty grammes or 771 grains of citrate contained in the bottle of mineral water, being about equal in effect to thirty or thirty-five grammes (463 or 540 grains) of crystallized sulphate.

Notwithstanding the large quantity of citrate in the mixture, the taste does not at all indicate the presence of any salt; it resembles lemonade in flavour, and acts as a purgative, quite as well as the ordinary seidlitz water. It certainly affords, from its agreeable taste, a good method of overcoming the repugnance of some patients to purgative medicines. It occasions neither thirst nor tenesmus, and but little pain during its operation, it may therefore be said that it operates safely and agreeably. Our observations would

indicate that the proper dose of the salt is forty-five grammes (694 grains) for a man, and forty grammes (617 grains) for a woman.

In the preparation of the magnesia lemonade according to the above formula, the first part of the operation consists in making a citrate of magnesia with excess of acid. In the second part of the process, part of the free citric acid is saturated with the carbonate of magnesia, carbonic acid being at the same time set free so as to make it an effervescent water, while there is sufficient uncombined citric acid to give it an acidulous taste.—*Pharm. Journ., from Journ. de Pharm.*

ART. LXIV.—ANTIDOTE TO PRUSSIC ACID.

By Messrs. T. and H. Smith.

Some time since, an antidote to the poison of prussic acid was made known to the public by us, through the medium of the *Lancet*, of 5th October last. Subsequently, Professor Christison, Mr. Taylor, and other eminent toxicologists, have sanctioned with their approval the principle of the proposed antidote, which, when tried on animals, proved so strikingly successful. It need only be repeated here, that the utility of the remedy rests on the presentation to the deadly acid of iron in such a state of oxidation, as to form with it the well-known compound called Prussian blue; and as the latter is innocuous to the stomach, animal life may be preserved wherever such a combination of the acid

with the iron can be timely formed. In suggesting this process, we claim only the merit of having noticed the necessity for presenting the iron in a double state of oxidation—of protoxide and peroxide—along with an alkaline carbonate, and of having made known a method for using the same as a remedy, safely, practically, and effectually.

As cases of poisoning by prussic acid are becoming, unfortunately, more and more numerous, it has occurred to to us that a simpler, though certainly inferior mode of using the remedy proposed by us, might have a chance of being more frequently available. By the first method the antidote would require to be prepared and kept in readiness, by practical chemists and medical men. The plan which we are about to propose renders this less urgently necessary. The materials for the antidote are among the most common articles of every laboratory or drug shop.

The English medical practitioner, who lately fell a victim to prussic acid, and who lived *twenty minutes* after being seen by his brother and partner in business, would in all human probability have recovered, had the following remedy been known and used—since the parties were in their own house, and had a laboratory close at hand. The materials required to form the antidote, are sulphate of protoxide of iron or green vitriol, tincture of the muriate of iron, and carbonate of potash, or the ordinary salt of tartar of the shops. The principle is the same as that first stated—the presentation, namely, of the protoxide and peroxide of iron to the prussic acid, in the presence of an alkaline carbonate, so as to cause its neutralization, but in a different way. We will now endeavour to explain how and in what proportions the different substances, composing the antidote are to be used, so as to secure the end aimed at.

As according to Phillips' observations as well as our own, one fluid ounce of the tincure of the muriate of iron con-

tains about thirty grains of peroxide of iron, one drachm must contain very little less than four grains; and as the prussian blue resulting from the action of the antidote is composed of two equivalents of sesquicyanuret of iron, and three equivalents of protocyanuret,

$$3\ Fe\ Cy + 2\ Fe_2\ Cy_3,$$

two equivalents of the sesqui or peroxide $80 \times 2 = 160$ with the proper quantity of a protosalt of iron, will separate nine equivalents, or 226.51 of prussic acid:

thus H Cy 1 equivalent $= 27.39 \times 9 = 246.51$.

Taking as the basis of our calculation the quantity of peroxide of iron contained in tincture of muriate of iron, it will be found by the rule of proportion, that one drachm of the tincture, containing four grains will neutralize 5.6 grains of real or anhydrous prussic acid, or 280 grains of the strength prescribed by the London College, thus

$$160 : 246.51 :: 4 : x = 5.6.$$

The relative quantity of sulphate of the protoxide of iron, or green vitriol, can also be learned by proportion, for as two equivalents of peroxide of iron are united to three equivalents of protocyanuret of iron, to constitute Prussian blue, every two equivalents of a peroxide of iron in solution must be mixed with three equivalents of a protoxide of iron also in solution; and as the equivalent of protosulphate of iron is 130, three equivalents will be 390, calculating from these figures, it will be found that four grains of peroxide of iron will require 9.75 grains of green vitriol, for

$$160 : 390 :: 4 : x = 9.75.$$

In the same way the correct quantity of salt of tartar, or carbonate of potash, may be found. The equivalent of this is, in round numbers, 70, of which nine equivalents must be present, along with the prussic acid to seize the nine equivalents of the strong acids, sulphuric and muriatic, contained in the mixed iron salts, to allow the prussic acid to

take their place. The affinity of prussic acid for iron, is not of itself sufficient to effect this result, but the two affinities—that of prussic acid for iron, and sulphuric and muriatic acids for the alkali—acting in concert, do so at once. Nine equivalents being $70 \times 9 = 630$, four grains of peroxide of iron will require 15.7 grains carbonate of potash, thus

$$160 : 630 :: 4 : x = 15.7.$$

According to the above calculation, one drachm of tincture of muriate of iron and 9.75 grains of green vitriol in solution, on being added to a liquid, containing 15.7 grains of carbonate of potash, can separate prussic acid from that liquid if present, whether in an open vessel or in the living stomach, to the extent of 5.6 grains; but in fact, it will be found that an amount equal to that is not separated. This is readily understood, when it is recollected that the common carbonate of potash is a very deliquescent salt, and further, that it is by no means pure; and besides this, the tincture of muriate of iron contains an excess of acid, which, with the alkaline carbonate will form chloride of potassium, which has no affinity for the prussic acid, but must have the effect to the extent of the quantity formed, of diminishing the amount of carbonate really effective in precipitating prussic acid. The practical result of these various disturbing causes, is, that on precipitating the prussic acid by the method above explained, from a liquid containing the acid in considerable excess, the Prussian blue, separated by filtration and converted into peroxide of iron, weighed, after ignition, instead of seven grains, only one-third of that number. So that instead of 5.6 grains of anhydrous prussic acid being removed, the real quantity was only a third of this; but it must be kept in mind, that if a quantity of acid exceeding that should be taken, it is but too probable that the unhappy individual would perish too quickly to allow of any means whatever being used. To make up to a certain

extent for the moisture and impurities of the salt of tartar, instead of using 15.7 grains, which is the correct quantity when in a pure state, twenty grains should be used. We would not recommend more than this, as an excess of alkali would so far prevent or redissolve the precipitate, causing the production of prussiate of potash; which, although it has been found to have no poisonous action on the human body, yet it seems better that the poison should be separated in an insoluble form.

To render our meaning more precise and clear, and less likely to be misunderstood, we will briefly state the course which we think ought to be adopted. On the one hand, dissolve ten grains of sulphate of protoxide of iron, or green vitriol, in an ounce of water, using a mortar to hasten solution, and adding one drachm of the tincture of muriate of iron. Put this liquid into a phial, and in another phial dissolve twenty grains of carbonate of potash, or, according to its common name, salt of tartar, in another ounce or two of water, and to prevent delay—the serious consequences of which cannot be two strongly impressed on the mind, as every moment bears a swift message of life or death to a human being—dispense with labelling, and let the person who prepares the antidote, if possible, go at once and give it himself.

The action of the antidote forms of itself a very pretty and interesting experiment, which may be shown in the following way:—Dissolve in one glass, containing a little water, eight grains of carbonate of potash, adding twenty or thirty drops of medicinal prussic acid, and in another glass, five grains of green vitriol in half an ounce of water, adding half a drachm of tincture of muriate of iron. Mix the two liquids together. As there is too small a quantity of prussic acid present to convert the whole of the iron into Prussian blue, the colour of this is masked by oxide of iron thrown down at the same time; but on adding a sufficient

quantity of a strong acid, such as nitric acid, to dissolve the oxide of iron, as Prussian blue is not soluble in the acid, it remains displaying its strikingly beautiful and characteristic blue colour.*—*Pharm. Journ.*

ART. LXV.—ON THE VARIETIES AND CLARIFICATION OF HONEY.

By Otto Köhnke.

1. *Varieties.*—It is well known that raw honey varies in its properties according to the nature of the vegetation from which the bees have gathered their food; according as the honey is obtained from cultivated or wild bees; according to the method and attention used in separating it from the wax, as well as according to the age of the honey and the manner of preserving it.

The honey of young bees is in general lighter coloured and more agreeable than that of old bees, even when both kinds of bees gather their honey in the same district, except when the honey is gathered from the flowers of the buckwheat, the common heath, and coniferous plants, in which case the honey of old bees may also be white. But young

[* The above should have found a place in our pages long since. Messrs. Larocque and Lepage have each examined the power of the proposed antidote, and agree that whilst it is no protection against the anhydrous poison, nor even certain when it is diluted with eight times its weight of water,—yet for the more dilute preparations, as that of our Pharmacopœia cherry laurel water, etc., it is very serviceable, and to be relied on if given in time.—Ed. Am. Jour. Pharm.]

bees always yield, under like circumstances, whitish honey, whether the same be separated from the wax without heat, or at a temperature of from 88°.25 F. to 99° F., and by pressure. It is also well known that honey becomes brown or impure if too great heat and too strong pressure be applied. Brown honey has a less specific weight, and does not become so quickly granular as white honey.

Bright yellow honey of young bees, whose food consisted chiefly of buckwheat blossoms, solidified, after three or four weeks, into a crumbly unctuous mass, and had a specific weight of from 1.425 to 1.429. *Honey of old bees* from the same place concreted only after four and six weeks and formed a crumbly unctuous mass, having a specific gravity of from 1.415 to 1.422.

Honey of a heath country (heath-honey) was of a pale yellow colour, harder than the before-mentioned, and had a specific weight of 1.425 to 1.434. From old bees of the same heath-country the honey was light brown, and had a specific weight of 1.422 to 1.430.

Honey of a marshy country (marsh-honey), where the bees had gathered their food chiefly from the flowers of the Brassica, Vicia Faba, and Trifolium, was almost white, hardened after six or eight days into a mass which could be compared to melted ox-tallow, and had a specific weight of from 1.435 to 1.440, and was consequently the heaviest of the whole and possessed the best qualities. Marsh honey, therefore, is in much request.

2. *Preservation.*—The preservation of honey is best effected in small wooden tubs with well closed lids, so that such a vessel when once opened may be emptied in three or four months. The honey after having run, and been pressed out of the comb at a temperature of from 88°.25 F. to 90° F. should be immediately poured in these vessels which should be put in a dry cool spot. When the honey has concreted, it should be covered with waxed paper, and and the vessels closed with well fitted lids. Earthen pots

are sometimes burst by the solidification of the honey, and they are, therefore, less suitable for the preservation of honey than small wooden casks. In damp air the honey gradually undergoes a partial decomposition: liquefying and becoming sour. If the acid of such old honey be saturated with milk of lime, some ammonia is evolved and lactate of lime formed. That the honey ferments, if it be watery, is well known. If the same after being diluted with water be saturated with lime a flocculent sediment is formed, which possesses the qualities of a ferment containing caseine.

It has been hitherto believed that all honey contains some free acid; but Köhnke tested recently separated and almost colourless marsh-honey, from more than fifty hives, with litmus paper, and could not discover any acid reaction. But upon testing honey from bees which had been killed by brimstone, an acid reaction took place.

3. *Clarification.*—As regards the purification of honey for medicinal use, there has been already so much written and proposed on it, that one would scarcely believe that anything new could be added; nevertheless we think that the following deserves notice. Köhnke prefers the method of purification by means of charcoal (*kohle*) to all other methods. In order, therefore, to prepare *Mel depuratum*, he takes ten parts by weight of solid honey, five parts by weight of water, and one part of animal charcoal (bone black), in pieces of the size of peas, and carefully separated from the fine powder. The whole is heated in a covered tinned copper kettle over a slow charcoal fire, at a temperature of 144°.5 F. to 167° F.

This heat is to be kept up for from twenty-four to thirty-six hours; frequently stirring the mixture. At last the heat is to be increased until the honey begins to boil, which must be only allowed to continue for one or two minutes. He then pours the whole into an earthen vessel, and lets it stand for six or eight days.

Should too much water have evaporated, and the specific weight be found heavier than 1.300, sufficient water must be immediately added after the ebullition. If the specific weight be lower than this, the raw honey must have been watery and light. In that case proportionately less water should be employed from the beginning.

In six or eight days the charcoal has settled to the bottom of the vessel, so that the now almost clear honey only requires to be poured upon a thick single or double woollen cloth, taking care not to disturb the sediment. From forty to fifty pounds of pure clear strained honey of 1.300 specific weight are obtained in a few hours. If brown honey was used, it appears after purification of a wine-yellow colour. White honey requires only half of the above-mentioned quantity of charcoal, consequently for twenty pounds of honey only one pound of charcoal is required, and the *Mel depuratum* thereby obtained is nearly colourless.

By this process the honey undergoes no decomposition. It is well-known, however, that honey boiled, according to the old method, diluted with water, for a longer period in an open vessel, loses its balsamic fragrance, and in general undergoes a remarkable change. But the honey purified by Köhnke's method is deprived of all opaque and waxy particles, has a specific weight of 1.300, and retains its natural fragrance, although in a weaker degree, together with the agreeable taste of the raw honey. If one or two drachms of it be diluted with from four to six ounces of water, no flocculi are deposited. An especial proof of its strength and purity consists in its becoming again granular after it has been for some time exposed to a temperature of from 54° to 58°.5 Fah. The residual charcoal and the filter or strainer should be washed with hot water in order to extract the residual honey, which may be employed for technical or economical purposes. The loss of honey, however, is scarcely worth consideration.—*Pharm. Journ. from Buchner's Repertorium.*

ART. LXVI.—ON A SIMPLE METHOD OF PREPARING CORROSIVE SUBLIMATE.

By. Drs. A. and C. Walter.

The authors propose turning to account the property which chlorine-water possesses of converting calomel into corrosive sublimate, for the preparation of the latter. According to the method which they describe, calomel is prepared from the protonitrate of mercury and chloride of sodium, and is then placed in several separate vessels, as in the preparation of chlorate of potash, each of which must be capable of containing, without being quite filled, 8 parts of water for every 1 part of calomel placed in it. The gas is first passed through a washing trough, and then successively through all the vessels, until the whole is converted into a clear solution. The filtered solution is then evaporated and set aside to crystallize. Even with calomel, which had not been recently precipitated, the process proved perfectly successful. It would be highly advantageous if hot water could be employed instead of cold, and the vessels, with the exception of the last, heated upon a sand-bath; only 4 times the quantity of water would then be required, and a great part of the evaporation would be spared. Calomel may also be rubbed to a paste with water, and chlorine passed into it, when it also furnishes corrosive sublimate in the form of a crystalline powder.—*Chem. Gaz. from Buch. Rep.*

ART. LXVII.—ON THE PREPARATION OF PURE BARYTIC WATER AND PURE SALTS OF BARYTES.

By H. Wackenroder.

When 240 grms. of finely-ground heavy spar are intimately mixed with 60 grms. of colophony and 20 grms. of powdered charcoal, and the mixture heated to redness in a covered crucible nearly filled with it, the sulphate of baryta is readily and advantageously decomposed. The ignition may be affected in an ordinary furnace of sheet iron provided with a dome, and is continued from half to three-quarters of an hour. When meal or sugar is employed for the reduction, and a very strong heat, approaching nearly to white heat, employed, soluble monosulphuret of barium is scarcely formed. The ignited mass is loose, yellowish-grey or reddish, and yields, on boiling with water in a porcelain dish, a saturated solution of baryta and bisulphuret of barium, together with some hyposulphite of baryta. The alkaline liquid is consequently yellowish, and deposits on suitable concentration a tolerable quantity of hydrate of baryta and some sulphuret of barium; the residue, insoluble in hot water, consists of undecomposed heavy spar with some coal, metallic sulphurets and the earthy substances mixed with the mineral and the coal. To prepare any salt of baryta, the sulphuret of barium is repeatedly exhausted with boiling rain-water, and the baryta precipitated by carbonate of soda. With very dilute nitric acid the solution readily yields perfectly pure nitrate of baryta, as this salt may be easily separated by crystallization from the less-easily crystallizing salts. Chemically-pure chloride of barium is most readily obtained. For this purpose, the solution is mixed with dilute crude muriatic acid until the liquid indicates the presence of a slight excess of acid; the precipitate of sulphur, sulphate of

baryta, and at times also sulphuret of arsenic, is separated by filtration, and the liquid evaporated until but little mother-ley is left, which contains chloride of calcium, chloride of strontium and perchloride of iron. The dried chloride of barium is readily freed from adhering muriatic acid and perchloride of iron by exposing to a faint red heat, dissolving in water and filtering. About one-third the amount of the heavy spar employed is obtained; if the whole of the heavy spar had been reduced, a much larger quantity of chloride of barium would naturally be obtained, but the loss of heavy spar, which however may be employed in subsequent operations, is fully compensated for by the lesser amount of labour required.

To obtain perfectly pure barytic water, the sulphuret of barium is exhausted with as little boiling water as possible, and the yellow liquid allowed to cool in a tall covered glass. Upon this the liquid is separated as perfectly as possible from the crystallized hydrate of baryta; the latter then dissolved in water, and boiled in a porcelain dish with pure hydrated oxide of copper until a sample of the liquid yields with solution of acetate of lead a white precipitate. If, after boiling the liquid for some time, it is found to contain some copper, it is filtered, and a small quantity of hydrated oxide of silver, or carbonate recently precipitated from the nitrate of silver by pure caustic or carbonate of soda, added to it. On digestion, every trace of hyposulphurous acid and oxide of copper is removed, and sulphuret of silver formed.—*Chem. Gaz. from Archiv. der Pharm.*

MISCELLANY.

Phosphorus Paste for the destruction of Rats and Mice. By M. SIMON, of Berlin.—The Prussian government issued an ordonnance on the 27th of April, 1843, directing the following composition to be substituted for arsenic, for destroying rats and mice; enjoining the authorities of the different provinces to communicate, at the expiration of a year, the results of the trials made with it, with the view of framing a law on this subject.

The following is the formula for this paste, as published in the *Berliner Medicinische Zeitung:*

Take of phosphorus 8 parts, liquify it in 180 parts of lukewarm water, pour the whole into a mortar, and add immediately 180 parts of rye meal; when cold, mix in 180 parts of butter melted, and 125 parts of sugar.

If the phosphorus is in a finely divided state, the ingredients may be all mixed at once, without melting them.

This mixture will retain its efficacy for many years, for the phosphorus is preserved by the butter, and only becomes oxydized on the surface.

Rats and mice eat this mixture with avidity; after which they swell out, and soon die.

M. Simon, has employed this mixture for many years, with constant success, by placing it in places frequented by those animals. According to him, the phosphorus is less dangerous than arsenic, for supposing the mixture to be badly made, and the phosphorus imperfectly divided, the oxydation which would take place in a few days would render it nearly inactive; and it would be almost impossible to employ it for the intentional poisoning of human beings.—*Pharm. Jour. from Jour. de Chim. Med.*

Fizeau's process of etching Daguerreotype Plates and its application to objects of Natural History. By MR. GOADBY.—In a Daguerreotype portrait, the black parts of the plate consist of silver, the white of mercury, and the intermediate tint of a mixture of the two, the degree of darkness or light depending upon the excess either of the silver or of

the mercury. In converting a Daguerreotype into an engraved plate, it is necessary to etch away the dark parts and to leave the white untouched. This is done by immersing the plate in a fluid, consisting of dilute nitric acid, nitrous acid, chloride of sodium, and nitrate of potash. The nitric acid is so far diluted, that no decomposition can take place until the mixture is heated, when the chloride of sodium and nitrate of potash are decomposed, and chlorine and nitrous acid are evolved. These attack and remove the silver, or the *dark* portions of the plate, but have no effect upon the mercury, so that the *lights* of the picture, being the mercurialized portions of the plate, constitute the *etching* ground, and effectually defend such portions of the Daguerreotype from the influence of the corroding fluid. After a time, those portions of the plate that have been acted upon by the chlorine, &c., become covered with a protecting coat of the chloride of silver: this must be removed by dilute liquid ammonia, when the biting may be continued by a fresh supply of the mixed acid. Grease and foreign matter must be removed by repeated washings in dilute acid and alkali, and by boiling in caustic potash. These cleansing operations must be repeated after every biting, after washing out the chloride of silver by the ammonia. The plate being thus bitten, but in a slight degree, is to be inked after the ordinary manner of engravers, and allowed to dry; the surface of the plate is then to be thoroughly polished, the ink still remaining in the corroded portions of the plate. It is now to be gilded by the electrotype, those parts alone receiving the gold that have been previously polished. The ink is then to be dissolved out of the hollows by potash: the parts that are gilded now constitute the etching ground, instead of the mercury, and the biting may be henceforth continued by nitric acid, in the customary usage of engravers. The plate thus etched, generally requires to be finished by the hand of the engraver, who has the advantage of a *perfect*, although *faint* picture to work upon. The amount of labour which he must bestow will depend upon the goodness of the Daguerreotype, and the success of the etching. M. Claudet has fully established the successful application of this process to the purposes of illustrating Natural History, by copying from Nature and engraving several delicate and difficult dissections of the lower animals, particularly the nervous system of Aplysia and Tritonia (the latter much magnified,) and the nutrimental organs *in situ* of a caterpillar. These preparations, together with the engravings of them, were handed round.

Dr. Carpenter stated, that a similar process had been employed for engraving microscopic objects, the discovery of which was due to Capt. Ibbetson. He exhibited some plates of blood-globules, and

other microscopic objects, published by Dr. Donne, of Paris, which had been procured in this way.—*Ibid.*, *Meeting of the British Assoc.*

Saponine and Ganteine for cleaning Kid Gloves.—M. Duvignau has taken out a patent for a preparation intended for cleaning gloves, and called saponine, which, according to the patent is made as follows:—

Take of	Soap in Powder	250 parts.
	Chloruret of Potash (Eau de javelle)	165 "
	Solution of Ammonia	10 "
	Water	155 "

Make the whole into a paste, a small portion of which is to be rubbed over the glove with a small piece of flannel, until it is sufficiently cleaned.

M. Buhan has prepared and sold a compound which he calls ganteine, which consists of soap and essence of citron, made into a paste with water.—*Pharm. Jour.*

On the Action of Nitric Acid upon Brucine. By A. Laurent.—It had been stated by Gerhardt, that nitrous æther was formed in the action of nitric acid upon brucine, when this, as is well known, is coloured red, an assertion which Liebig declared to be unfounded. Laurent, who repeated Gerhardt's experiment, arrived at the same result, but obtained moreover a new substance, which he calls *cacotheline*, the composition of which is represented by the formula $C^{10}H^{22}N^{4}O^{10}$. This substance yields, on treatment with ammonia, various products, one of which is a powerful base.—*Chem. Gaz. from Comp. Ren.*

Preparation of Aurocyanide of Potassium for Electro-Gilding. By Alex. Kemp.—Dissolve 1 part of gold in nitrohydrochloric acid, and render the solution as neutral as possible by evaporation to dryness; redissolve the chloride of gold in 8 parts of water, and heat the solution until it boils; add as much calcined magnesia as is equal to half the weight of the gold, and boil the whole till the liquid loses its yellow colour; the precipitate which forms is oxide of gold, with the excess of magnesia. Throw it on a filter, and wash it with boiling water until the liquid passes through tasteless. Having dissolved 8 parts of Liebig's cyanide of potassium in 80 of boiling water, pour it on the filter while still hot, it will dissolve the oxide of gold, leaving the magnesia unchanged. The same method may be followed in forming the silver solution, substituting nitric acid for the mixture of nitric and hydrochloric acids used in forming the gold solution.—*Ibid.*

On Thialdine and Selenaldine, two new artificial organic bases. By MM. Wohler and Liebig.—On passing hydrosulphuric acid into an

aqueous solution of aldehyde of ammonia containing a few drops of free ammonia, the authors produced a beautiful new base, free from oxygen, and containing a large proportion of sulphur. This body, to which they give the name of thialdine, is obtained in large crystals, insoluble in water, but soluble in alcohol, and much more so in ether. It forms crystallized and well-defined salts with the acids.

The analysis of these bodies gave the following results:—

Thialdine	$C^{12} H^{13} N S^4$
The hydrochlorate	$C^{12} H^{13} N S^4, H Cl$,
The nitrate	$C^{12} H^{13} N S^4 N O^5, H O$.

The following equation expresses the mode of formation of thialdine:—

$$3 (N H^4 O, C^4 H^3 O) + 6 H S = C^{12} H^{13} N S^4 + 6 H O + 2 N H^4 S.$$

Aldehydite of ammonia. Thialdine. Sulphide of ammonia.

On substituting hydroselenic for hydro-sulphuric acid, the corresponding selenium compound, selenaldine, is obtained, which, though it greatly resembles the former base, is far more liable to decomposition.—*Chemist.*

Chloride of Soda as a test for the presence of Guaiacum in resin of Jalap. By M. Smedt.—It has long been known that chlorine possesses the property of rendering resin of guaiacum blue. According to the author, the chlorides of soda and of lime also possess this property, and may be used for detecting the smallest traces of guaiacum resin when mixed with resin of jalap. In fact, two grains of a mixture of fifteen parts of resin of jalap, and one part of guaiacum resin, dissolved in f℥j. of spirit, specific gravity .825, gives on the addition of a single drop of solution of hypochlorite of soda (chloride of soda,) a green streak, which is deposited as a precipitate to the bottom of the glass, leaving the supernatant liquor of its original colour.

The sensibility of this reaction is such, that the presence of one part of guaiacum resin in 320 parts of resin of jalap may be indicated.

M. F. Boudet has found that this test may be applied with equal advantage for detecting the presence of guaiacum resin in scammony.—*Pharm. Jour. from Jour. de Pharm.*

New Green Ink. By M. Winckler.—Dissolve 180 grains of bichromate of potash in f℥j of water; add to the solution, while warm, f℥ss of spirit of wine, then decompose the mixture with strong sulphuric acid until it assumes a brown colour. Evaporate the liquor to one half, let it cool, dilute it with f℥ij of distilled water and filter it, then

add fℨss of spirit of wine, add a few drops of strong sulphuric acid, and let it stand. After some time the ink assumes a beautiful green colour, and is rendered fit for use by the addition of a small quantity of gum arabic.—*Ibid, from Jour. de Chim.*

Simple and easy process for quickly preparing the Iodide of Potassium. By M. J. H. Pypers.—The process of M. Pypers consists in slightly heating a mixture of 100 grains of iodine, 2 drachms of water, 75 grains of carbonate of potassa, with 30 grains of iron filings.

The mass is dried to redness. The resulting red powder is treated with water; then filter and evaporate to dryness.

100 parts of iodine will furnish 135 parts of very white iodine of potassium, but slightly alkaline.—*Chemist from Jour. de Chim.*

Note on the preparation of Scammony and its employment. By M. Wimmer.—The author recommends the following formula, as offering the greatest advantages:

℞ Pure scammony resin	3 grammes.
Venice soap	25 centigrammes.
White sugar	275 "

Mix, and reduce to fine powder. Then add by degrees—

Powdered biscuit	24 grammes.
Water	a few drops.

Triturate well, and carefully, to remove the powder that may be attached to the pestle, and then mix with the remainder of the powder.

These powders are afterwards dried in the air, and divided into packets of 30 grammes each.

3 grammes of the powder contains 30 centigrammes of scammony.

The dose is from 50 centigrammes, which is sufficient to produce several stools in the case of an adult. For children of 15 years of age, the dose is reduced to 30 centigrammes, for those of seven or eight years to 20 centigrammes, and finally for children of two years of age to 10 centigrammes.

These powders, in addition to their purgative properties, have the advantage of being an easily administered vermifuge.—*Ibid.*

On the Preparation of Hyposulphite of Soda. By E. F. Anthon.—If dry sulphurous acid be conducted over powdered sulphuret of sodium (in a dry state) no action is observed; but if the sulphuret has previously been moistened with about 20 per cent. of water, the sulphurous acid is then very quickly absorbed, provided the sulphuret contain an excess of carbon (*kohle;*) and was exposed only to such a tem-

perature that it could not melt, and but only slightly concrete. During the absorption of the sulphurous acid a strong developement of heat takes place; and the pulverulent sulphuret of sodium becomes moist. These phenomena can be easily noticed if the sulphuret be placed in a glass tube, and the sulphurous acid be allowed to enter from beneath. At this stage no odour can be perceived at the upper opening of the tube, but as soon as the heating and moistening of the sulphuret have arrived at the upper end of the tube, sulphuretted hydrogen gas begins to be developed, and sulphur to sublime on the sides of the tube. If the experiment be now interrupted, hyposulphite of soda, containing carbon and some sulphuret of sodium, is found in the tube. This forms with water a pale yellow-coloured solution; but if the sulphurous acid be allowed to pass as long as the sulphuretted hydrogen is detected, and until nothing but the excess of sulphurous acid is perceived, the product gives, when mixed with water, a colourless solution, which is free from sulphuret of sodium, and, therefore, quickly changes, on the admission of air, into sulphite and sulphate of soda.

The sulphuret of sodium gains about 70 per cent. in weight (the water included.) The whole experiment lasts, when small quantities of sulphuret are used, scarcely a quarter of an hour, and from the carbonaceous crude mass, crystallized hyposulphite of soda can be easily obtained.

The facility with which solid hydrous sulphuret of sodium (hydrosulphuret of soda) is converted, by means of sulphurous acid, into hyposulphite of soda, affords, therefore, a simple and cheap means of procuring this salt, which has latterly acquired some importance for Daguerreotyping and in the manufacture of paper.

With regard to this process, it is particularly to be observed, that the transmission of the sulphurous acid into the powdered sulphuret of sodium must be stopped before the developement of sulphuretted hydrogen gas has ceased, in order to obtain hyposulphite of soda, containing some sulphuret of sodium, and consequently permanent in the air.—*Pharm. Jour. from Buch. Reper.*